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FWS/OBS-81/30
October 1981

ORIGINAL

Pacific Coast Ecological Inventory

USER'S GUIDE AND INFORMATION BASE

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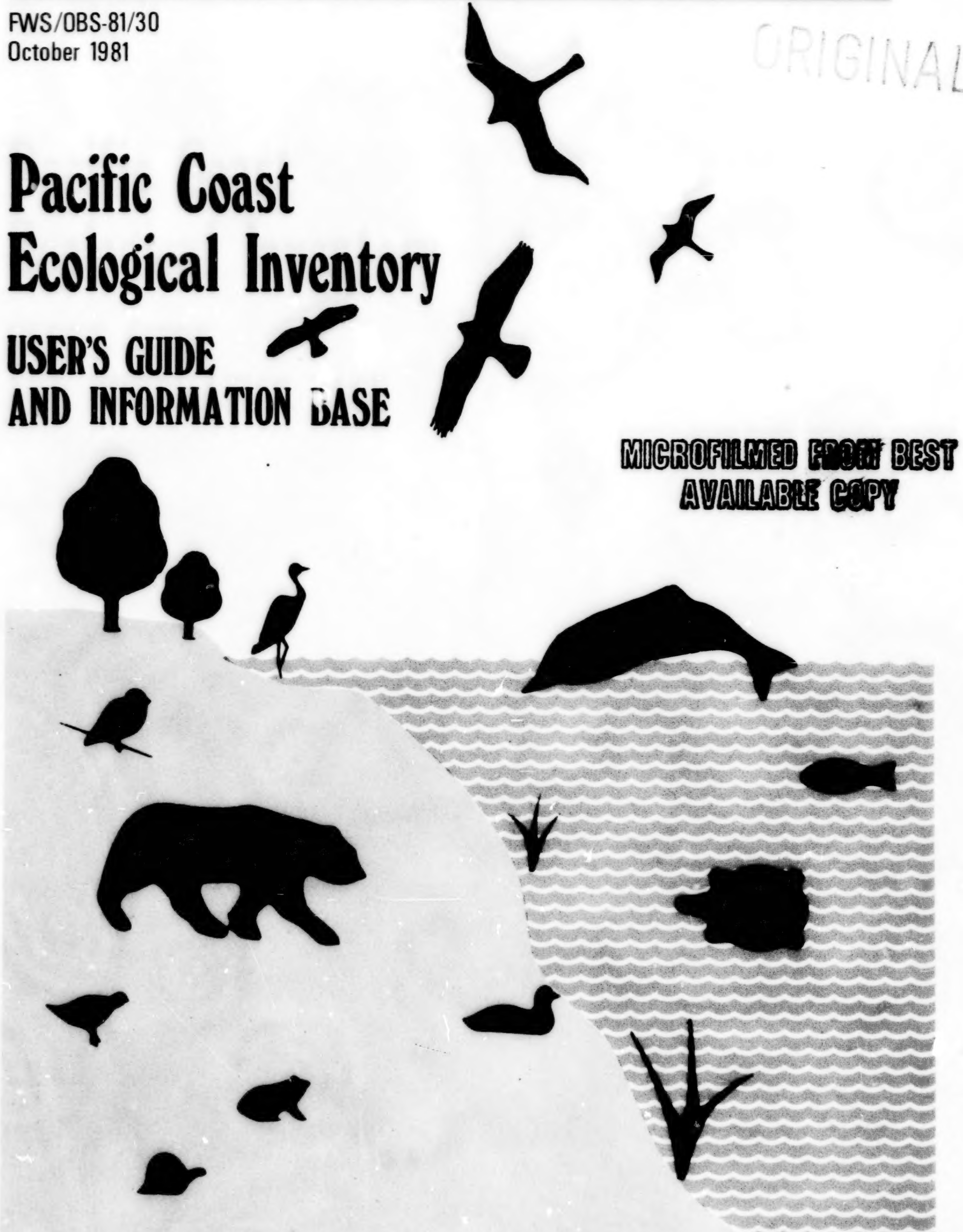

Fish and Wildlife Service

U.S. Department of the Interior

COMPLETED

FWS/OBS-81/30
July 1981

PACIFIC COAST ECOLOGICAL INVENTORY
USER'S GUIDE AND INFORMATION BASE

by

Angelo D. Beccasio
John S. Isakson
Alice E. Redfield
William M. Blaylock
Harry C. Finney
Ronald L. Frew
Dennis C. Lees
Diane Petrula
Roy E. Godwin

Dames & Moore
Suite 700
7101 Wisconsin Avenue
Bethesda, MD 20814

Project Officer
Larry R. Shanks
National Coastal Ecosystems Team

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National Coastal Ecosystems Team
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PREFACE

The U.S. Department of the Interior and the Fish and Wildlife Service (FWS) have played major roles in issues involving the siting of coastal energy-related projects. The basis for the Department's position on these types of projects has been the National and regional significance of the fish and wildlife resources at the proposed sites and the susceptibility of these resources to new or added stress.

Given the projected needs for oil- and energy-related facilities along the Pacific coast, as well as the future likelihood for Departmental involvement in siting issues, the Under Secretary of the Interior proposed that "...Government should take the initiative in helping industry find locations for refineries, power plants, and other energy stations which would best serve the interests of all involved" (news conference, Norfolk, Virginia, 2 January 1979). In addition, the Council on Environmental Quality has explored what Federal agencies might do to provide advance information on the environmental sensitivity of various coastal areas to the impacts of major energy facilities.

The objective is to produce an inventory of those important ecological resources along the Pacific coast on which coastal siting of refineries, petrochemical, and gas or liquid natural gas facilities could have an impact.

Questions about, or requests for copies of this publication should be addressed to:

Information Transfer Specialist
National Coastal Ecosystems Team
U.S. Fish and Wildlife Service
NASA-Slidell Computer Complex
1010 Gause Boulevard
Slidell, Louisiana 70458

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TABLE OF CONTENTS

Page

PREFACE. ii

LIST OF TABLES vi

LIST OF FIGURES. vii

ACKNOWLEDGEMENTS viii

PART 1 INTRODUCTION 1

1.1 BACKGROUND 1
1.2 PURPOSE AND SCOPE. 1
1.3 COASTAL CLASSIFICATION AND DESCRIPTION 2
1.4 LIST OF SOURCES FOR THE COASTAL CLASSIFICATION AND DESCRIPTION. 6

PART 2 METHODOLOGY. 7

2.1 COASTAL ZONE BOUNDARIES. 7
2.2 DATA COLLECTION AND REPORTING. 7
2.3 DATA REVIEW AND ANALYSIS 8
2.4 INVENTORY GRAPHICS 14

2.4.1 The Maps and Grid System. 14
2.4.2 Cartographic Discussion 14
2.4.3 Inventory Map Development 17

2.5 LIST OF SOURCES FOR COMMON AND SCIENTIFIC SPECIES NAMES. 17

PART 3 USER'S GUIDE 20

3.1 THE INVENTORY MAPS 20
3.2 HOW TO USE THE INVENTORY MAPS. 20

3.2.1 Land Use/Land Cover 20
3.2.2 Aquatic Orgnisms. 23
3.2.3 Terrestrial Organisms 25

3.3 HOW TO USE THE GRID REFERENCE SYSTEM 25

PART 4 SOUTHWEST PACIFIC ZONE (GRID REFERENCE MF89 to CV87) 27

4.1 INTRODUCTION 27

4.1.1 Physical Description. 27
4.1.2 Special Land Use Areas. 29

TABLE OF CONTENTS (continued)

Page

4.2 RESOURCES OVERVIEW 29

4.2.1 Species with Special Status 43
4.2.2 Aquatic Resources 54
4.2.3 Terrestrial Resources 67

4.3 SOUTHERN CALIFORNIA COAST (GRID REFERENCE MF89 to GP31). 69

4.3.1 Aquatic Resources 70
4.3.2 Terrestrial Resources 71

4.4 CENTRAL CALIFORNIA COAST EXCLUDING SAN FRANCISCO BAY (GRID REFERENCE GP12 to CV87). 76

4.4.1 Aquatic Resources 77
4.4.2 Terrestrial Resources 78

4.5 SAN FRANCISCO BAY (GRID REFERENCE ES83 to FT29). 83

4.5.1 Aquatic Resources 83
4.5.2 Terrestrial Resources 84

4.6 LIST OF SOURCES FOR THE SOUTHWEST PACIFIC ZONE 86

PART 5 NORTHWEST PACIFIC ZONE (GRID REFERENCE CV87 to DK72) 101

5.1 INTRODUCTION 101

5.1.1 Physical Description. 101
5.1.2 Special Land Use Areas. 103

5.2 RESOURCES OVERVIEW 103

5.2.1 Species with Special Status 103
5.2.2 Aquatic Resources 117
5.2.3 Terrestrial Resources 124

5.3 PACIFIC NORTHWEST COAST EXCLUDING THE COLUMBIA RIVER ESTUARY (GRID REFERENCE CV87 to CJ76). 127

5.3.1 Aquatic Resources 127
5.3.2 Terrestrial Resources 130

5.4 COLUMBIA RIVER ESTUARY (GRID REFERENCE DG21 to DG12). 133

5.4.1 Aquatic Resources 133
5.4.2 Terrestrial Resources 135

TABLE OF CONTENTS (continued)

Page

5.5 PUGET SOUND (GRID REFERENCE CJ76 to DK72). 136

5.5.1 Aquatic Resources 136
5.5.2 Terrestrial Resources 137

5.6 LIST OF SOURCES FOR THE NORTHWEST PACIFIC ZONE 140

APPENDIX Terrestrial Plant Species with Special Status. 156

LIST OF TABLES

Number		Page
1	Classification scheme for Pacific coast ecosystems.	5
2	Species or groups of organisms (with identifying numbers) in the Pacific coast ecological inventory	9
3	USGS maps (1:250,000) used in the Pacific coast ecological inventory and corresponding Terrell zones and sections.	16
4	Summary of information shown on Pacific coast ecological inventory maps.	21
5	Designated land use areas for the Southwest Pacific Zone	30
6	Species with special status in the Southwest Pacific Zone	44
7	Terrestrial plant species with special status in the Southwest Pacific Zone.	47
8	Inventory of terrestrial plant species with special status in the Southern California Coast section	72
9	Inventory of terrestrial plant species with special status in the Central California Coast section.	79
10	Inventory of terrestrial plant species with special status in the San Francisco Bay section.	85
11	List of sources for the Southwest Pacific Zone.	87
12	Designated land use areas for the Northwest Pacific Zone	104
13	Species with special status in the Northwest Pacific Zone	115
14	List of sources for the Northwest Pacific Zone.	141

LIST OF FIGURES

Number		Page
1	The study area for the Pacific coast ecological inventory	3
2	Classification scheme for Pacific coast ecosystems, showing zones and sections.	4
3	Index to USGS map sheets (scale 1:250,000) and major zones of Pacific coast ecological inventory.	15
4	Portion of the Pacific coast ecological inventory map of Ukiah, California.	24
5	Major sections of the Southwest Pacific Zone.	28
6	Major sections of the Northwest Pacific Zone.	102

ACKNOWLEDGMENTS

The U.S. Fish and Wildlife Service (FWS) would like to thank Bill Jones, Bruce Palmer, and John Roney employed by the U.S. Geological Survey for their assistance in the design and quality control in producing the maps for this study.

We would like to thank Dr. Jay Watson, FWS Portland, Oregon, for his role in coordinating the map review with various Federal, state, and local groups. We would also like to thank Dr. J. Albert Sherk (FWS) for his role in coordinating the inventory effort at the Washington, DC, office level.

Valuable resource information, which was key to the accomplishments of this inventory effort, was contributed by numerous Federal and state agencies, and private individuals and groups. These included biologists and experts from the U.S. Fish and Wildlife Service, California Department of Fish and Game, U.S. Army Corps of Engineers San Francisco and Los Angeles Districts, San Francisco Bay Development Commission, California Coastal Commission, National Marine Fisheries Service, Oregon Department of Fish and Wildlife, Washington Department of Fisheries, Washington Department of Game, Washington Department of Ecology, Pacific OCS Office, Bureau of Land Management, and Columbia River Estuary Study Taskforce. We sincerely thank all information contributors.

PART 1

INTRODUCTION

1.1 BACKGROUND

Recent actions, such as Outer Continental Shelf (OCS) oil and gas leasing and the transshipment of Alaskan oil, have highlighted the need for advanced planning in siting Pacific coast energy facilities. The U.S. Department of the Interior and the Fish and Wildlife Service (FWS) have played major roles in issues involving major coastal projects. Given the anticipated needs for energy facilities along the Pacific coast, as well as the likelihood of future Department involvement in siting issues, the FWS has conducted an ecological inventory to assist industry in their advanced planning and evaluation procedures. FWS's intent is to lessen the chance for serious disputes during the later permit review evaluation process.

This study resulted in the production of 30 fish and wildlife coastal inventory maps (referred to in this report as maps) and a User's Guide and Information Base (referred to as the report). This is an effort by FWS to provide planners and industry officials with assistance and guidance in their plans for environmental protection. The maps reduce the potential for conflict by depicting areas or resources that are most ecologically or economically valuable and that could be most vulnerable to the construction and operation of energy facilities. In addition, the maps should be of assistance in reducing environmental damage from energy facilities at any location along the Pacific coast.

Although the value of the inventory maps is somewhat restricted by their scale and the availability of fish, wildlife, and habitat information, this report and the maps provide a comprehensive inventory of the natural resources of the Pacific coast. These resource maps have been sought by coastal planners for coastal zone management and oil spill contingency planning. This study is the second of a series which began with the Atlantic coast ecological inventory, completed in 1980.

1.2 PURPOSE AND SCOPE

The purpose of the User's Guide and Information Base report and the inventory maps is to establish the extent of natural resources, as well as their location and value. The report supplements the maps with biological descriptions and lends support and credence to the map inventories. The maps identify significant natural resource areas and fish and wildlife resource concentrations along the Pacific coast which are vulnerable to the construction and operation of oil- and gas-processing facilities and transportation systems. The focus of this inventory is on the ecological resources subject to the provisions of the Fish and Wildlife Coordination Act, the Endangered Species Act, and other related legislation. The area covered by the inventory extends from the United States-Mexico border to the United States-Canada border, including Puget Sound. The study area includes the shoreline seaward to the Federal-state demarcation zone (the three-mile limit), including offshore islands such as the San Juan and Farallon Islands, and inland to the coastal zone boundary as defined by each state. In special cases, the study area extends inland to the head of navigable waterways under tidal influence, or to limits determined by FWS.

The maps provide an inventory of important coastal fish and wildlife species and their habitats. Other land use designations, such as wildlife refuges, parks, and Federal Class I air quality areas, are also included. The maps and this report do not designate areas where energy facilities or transportation systems should be located, but rather they identify areas of significant concern. The maps are not intended to be the only source of resource information for the Pacific coast. Due to the maps' small scale and schedule constraints on data collection, only significant species' locations and distributions are presented.

1.3 COASTAL CLASSIFICATION AND DESCRIPTION

The study area (shaded coastline, Figure 1) covers portions of three coastal states and occupies approximately 104,000 square kilometers (40,150 square miles). The study area has been categorized according to the hierarchical classification scheme for coastal ecosystems developed by Terrell (1979). This report is organized according to the Level I (zones) and Level II (sections) subdivisions which compose Terrell's classification (Figure 2). A description of each section in each zone is given in Table 1. The six sections provide the format for describing the resources identified in the inventory.

The Southwest Pacific (Coastal) Zone occupies the southern half of the study area (Figure 2) and extends from the Mexican border to Cape Mendocino, California. Within this zone are the Southern California Coast, Central California Coast, and San Francisco Bay sections.

The Southern California Coast section, from the Mexican border north to Point Conception, is characterized by a fairly smooth coastline bordered by low, narrow mountain ranges. A few large islands, including San Clemente Island, Santa Catalina Island, and Santa Rosa Island, are situated just offshore. Generally sandy beaches are bounded by both low and high cliffs with a few rocky promontories. Freshwater inflow to small lagoons and estuaries is generally low.

The Central California Coast section extends from Point Conception north to Cape Mendocino, excluding San Francisco Bay. This section occupies a fairly rugged coastline consisting of parallel ranges with rounded crests of variable height. Small beaches are generally bounded by high rocky cliffs. Moderate freshwater inflow is provided by short, incised, westerly flowing streams.

The San Francisco Bay section consists mostly of low-lying mudflats. Moderate freshwater flow into this embayment is provided by large streams such as the Sacramento and San Joaquin Rivers.

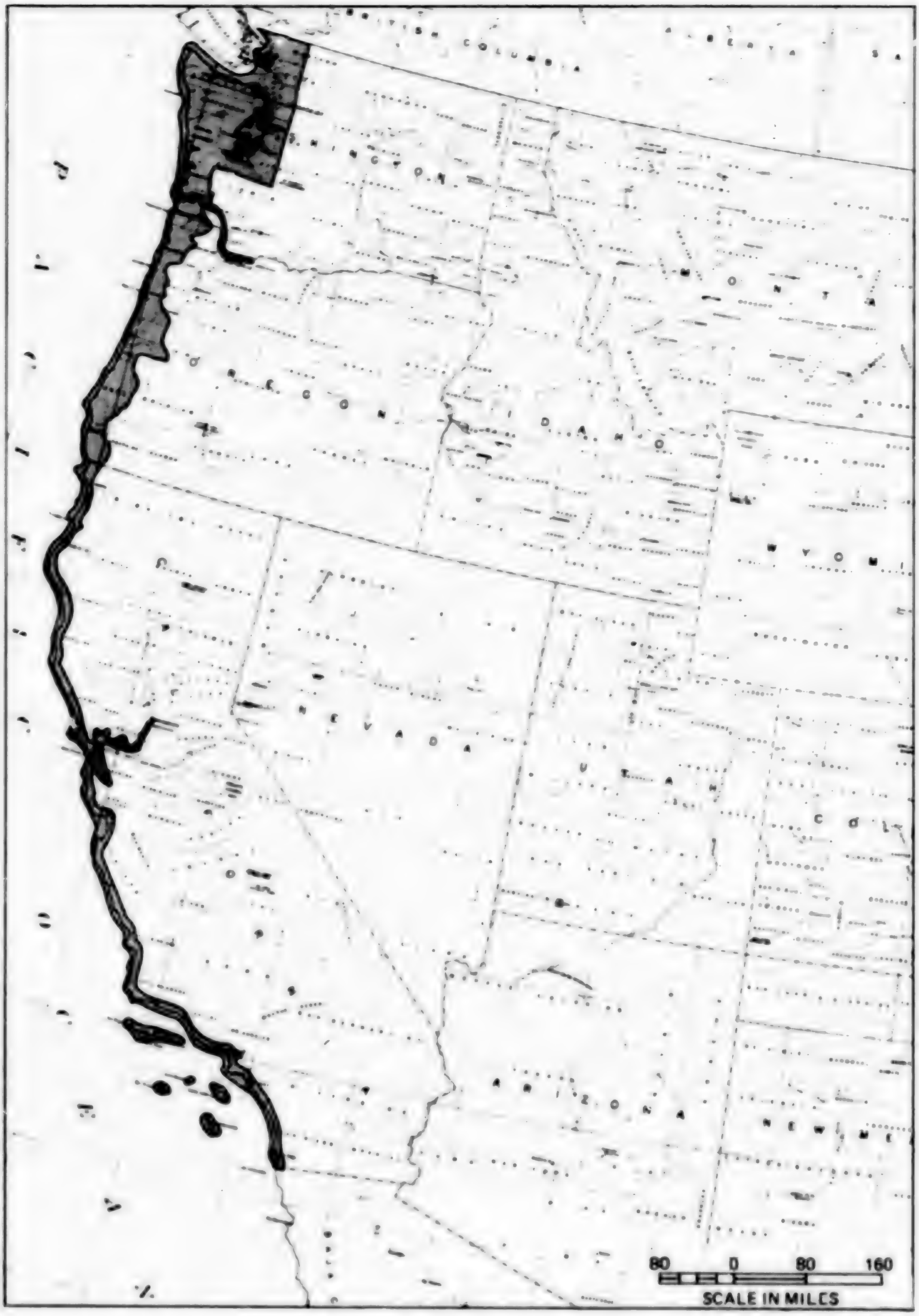

Figure 1. The study area for the Pacific coast ecological inventory (shaded coastline).

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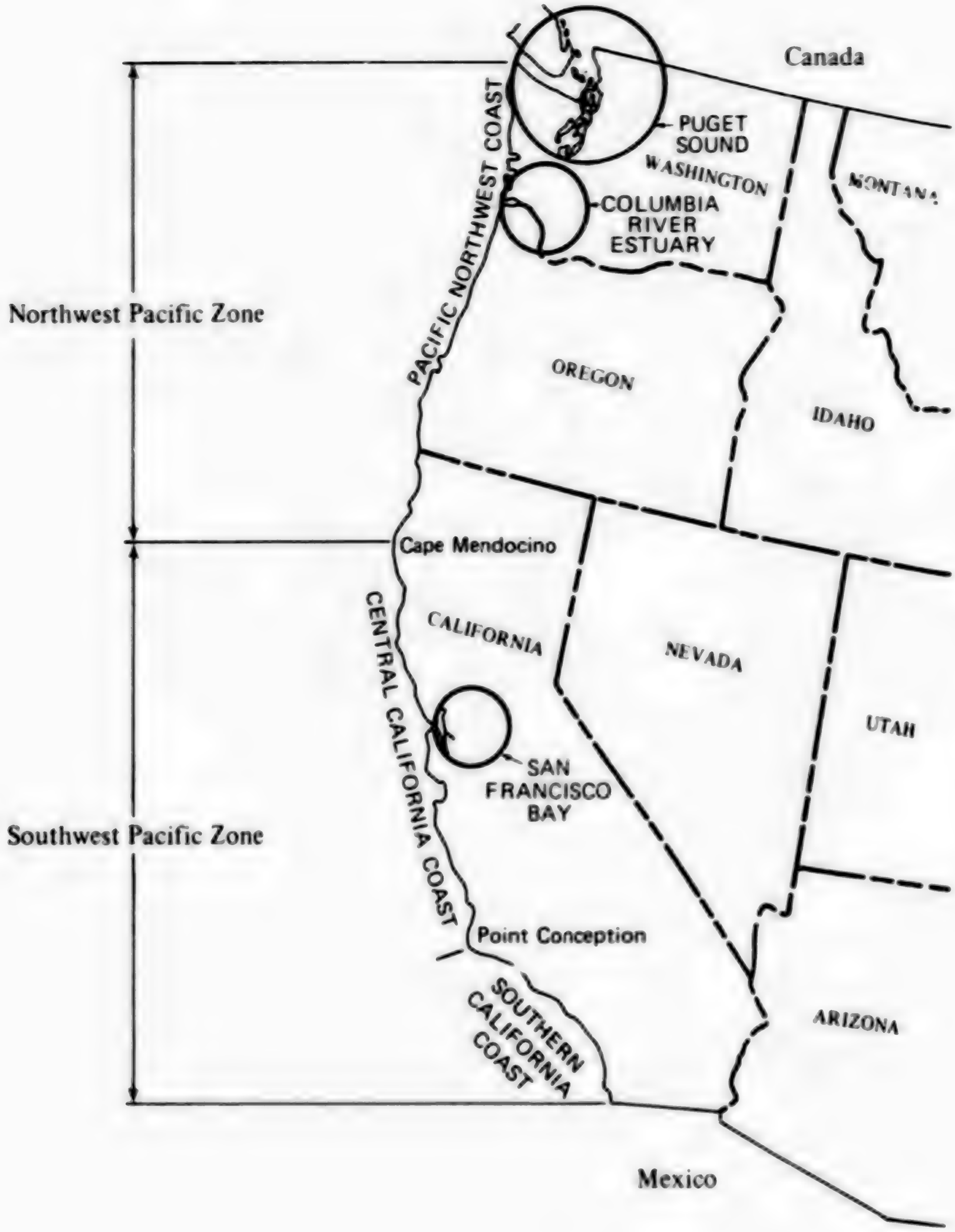

Figure 2. Classification scheme for Pacific coast ecosystems, showing zones and sections (modeled after Terrell, 1979).

Table 1. Classification scheme for Pacific coast ecosystems (modeled after Terrell, 1979).

Level I (zones)	Level II (sections)	Boundaries	Section descriptions
Southwest Pacific	Southern California Coast	California-Mexico border to Point Conception	Fairly smooth coastline with a few large islands; both low- and high-cliffed beaches which are mainly sandy with a few rocky promontories; sporadic seasonal high freshwater inflow, but generally low-to-no freshwater inflow; extensive algal communities; kelp beds.
	Central California Coast	Point Conception to Cape Mendocino (excluding San Francisco Bay)	High-cliffed beaches, mostly rocky but some sandy with a high frequency of pocket beaches in some areas; moderate freshwater inflow; extensive algal communities; kelp beds.
	San Francisco Bay	San Francisco Bay	Highly protected from marine influence; some low-cliffed beaches, but mostly low-lying mudflats with a few pocket beaches and marshes; moderate freshwater influence.
Northwest Pacific	Pacific Northwest Coast	Cape Mendocino to the Strait of Juan de Fuca (excluding the Columbia River Estuary)	High-cliffed beaches mainly with numerous pocket beaches, but a few extensive sandy or rocky beaches; some lower rocky coastal flats; moderately dissected coastline with numerous rocky islands, small bays, and estuary systems with mudflats and eelgrass beds; cool water temperatures; high freshwater inflow.
	Columbia River Estuary	Columbia River Estuary from Clatsop Spit to Cape Disappointment	Separated mainly due to high freshwater inflow generated far inland; extensive inland marsh complex.
	Puget Sound	Puget Sound and the Straits of Juan de Fuca and Georgia	Relatively protected from direct marine influence by Olympic Peninsula; highly complex coastline with numerous islands; high freshwater inflow.

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The Northwest Pacific (Coastal) Zone occupies the northern half of the study area (Figure 2) and extends from Cape Mendocino, California, to the Canadian border. The boundary dividing this zone from the Southwest Pacific Zone roughly coincides with the portion of the coast where water temperatures change from warm to cool. Within the Northwest Pacific Zone are the Pacific Northwest Coast, Columbia River Estuary, and Puget Sound sections.

The Pacific Northwest Coast section occupies the major portion of the coast in this zone. The coastline is rugged and bounded by high rocky cliffs. Rocky islands, small bays, and estuary systems with mudflats are common. A high freshwater inflow is provided by numerous incised, westerly flowing streams.

The generally rugged character of the Pacific Northwest Coast is interrupted by the Columbia River Estuary section, a low relief, fluvio-marine embayment. This section is characterized by high freshwater inflow and an inland marsh complex.

The Puget Sound section exhibits a complex coastline with numerous islands and diverse lowlands, parts of which are submerged. This section is relatively protected from marine influence by the Olympic Peninsula, a high-relief, volcanic upland characterized by local alpine peaks and steep slopes. Freshwater inflow into the Puget Sound trough is high from the basin's eastern shores.

1.4 LIST OF SOURCES FOR THE COASTAL CLASSIFICATION AND DESCRIPTION

Fenneman, N.M. Physiography of the western United States. New York: McGraw-Hill Publishers; 1939.

Terrell, T.T. Physical regionalization of coastal ecosystems of the United States and its territories. U.S. Department of the Interior, Fish and Wildlife Service, Coastal Ecosystems Project; 1979. Available from: U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC; FWS/OBS-78/80.

PART 2

METHODOLOGY

2.1 COASTAL ZONE BOUNDARIES

Information on the inland coastal zone boundaries was obtained from reports and maps supplied by the Office of Coastal Zone Management of the National Oceanic and Atmospheric Administration (NOAA) and by each of the three states along the Pacific coast. In all instances, the coastal zone boundaries of the study area have been extended inland beyond the first tier limits specified by the individual state coastal zone commissions. In California, the coastal zone boundary has been arbitrarily extended from the nominal 0.8-kilometer (0.5-mile) width specified by the California Coastal Commission and the San Francisco Bay Conservation and Development Commission to a minimum width of 13 kilometers (8 miles) inland from the shoreline. For Oregon, the inland coastal zone boundary is generally defined by a series of coastal watersheds. In Washington, the inland coastal zone boundary includes areas of coastal counties west of the 122° meridian. For specific locations of accepted coastal zone management boundaries, contact the appropriate state coastal zone management agency.

2.2 DATA COLLECTION AND REPORTING

The data used to compile the habitat inventory maps and the supporting narrative report were collected from numerous organizations; Federal agencies included the FWS, the National Marine Fisheries Service (NMFS), the Bureau of Land Management (BLM), NOAA, and the Environmental Protection Agency (EPA). The water, natural resource, and parks and recreation divisions of the three states provided much of the information, as did such private organizations as the California Native Plant Society, regional planning commissions, and universities. The sources acquired from these agencies were reviewed and analyzed for each geographic area; information on major habitats and fish and wildlife resource groups was abstracted. For a complete listing of all information sources contacted, and the type of resource data each provided, see the List of Sources included at the end of each part of this report. Major emphasis was placed on information that was accurate, useful, and applicable to the inventory maps.

Because the base map scale was relatively small (1:250,000), the amount of information shown on each inventory map was considered carefully to avoid excessive detail and confusion. If more detailed information on specific biological resources is required, the user is advised to refer to the List of Sources at the end of each part as well as to contact the appropriate Federal and state agencies. For example, the Atlas of California Coastal Marine Resources, available from the California Department of Fish and Game, is a detailed source of information from which mapped information on aquatic species was generalized for the inventory graphics. Likewise, the Coastal Zone

Atlas of Washington, available from the Washington Department of Ecology, is a source for more detailed information in the Northwest Pacific Zone.

Major elements of the map inventory were the depiction of species with special status and special land use areas. The location of every endangered or threatened species and all special land use areas (such as parks, wildlife refuges, and preserves) within the study boundaries were shown on the maps where data were available.

The maps represent significant resources using both point feature and area feature symbols. Instead of multiple overlays, the information on a single map was indicated by using various symbols, colors, and patterns. This method was found to provide the most uncluttered, readable, and understandable map.

Major categories shown on the inventory maps were species with special status (e.g., the endangered leatherback sea turtle), valuable resources (e.g., shellfish and waterfowl), migratory routes (e.g., coho salmon and shorebirds), and seasonal habits (e.g., overwintering). Additional information about distribution, density, and life history of a particular species or group was incorporated in this report for each of the coastal zones (parts 4 and 5).

2.3 DATA REVIEW AND ANALYSIS

The data and literature search included cataloging, reviewing, and analyzing a large amount of ecological data. This review was a major task, and deciding what data should be included on the maps required considerable judgement.

One or more writers of this report visited selected areas within each of the two major zones. They collected information and corresponded with ecologists and fish and game agency personnel. However, most of the information was obtained by telephoning Federal, state, local, and private groups familiar with the resources of a particular area and by requesting appropriate reports and data.

A list of most of the important plants and animals (and their scientific names) in the study area (356 species) is given in Table 2. Data were compiled for each species which had a special status designation (endangered or threatened) and for groups (e.g., fish or birds) and types of habitat (e.g., seagrasses or marshes). When available, resource statistics also were compiled. The types and amount of detail shown on each map were dependent on the types and amount of information available.

Data were most available for species which are threatened or endangered, and for fish and wildlife species that support commercial or sport industries. For major fisheries, data on the maps include spawning and nursery areas, shellfish bed locations, and fishing areas. For birds, wildlife, and marine mammal species of major importance, the nesting, wintering, migratory, and major concentration areas were indicated on the maps if data were available. Because many groups or species occur ubiquitously, the notebox on each map indicates their occurrence in each area. Areas of special biological concern, such as seagrass beds, beaches/dunes, offshore islands, and marshes, are

Table 2. Species or groups of organisms (with identifying numbers) in the Pacific coast ecological inventory.*

AQUATIC SPECIES

PLANTS (1 through 49)

1	Kelp
2	Giant kelp (*Macrocystis* spp.)
3	Bull kelp (*Nereocystis lutkeana*)
4	Laminarians (*Laminaria* spp.)
5	Laver (*Porphyra* spp.)
6	Eelgrasses (*Zostera marina*)
7	Surfgrasses (*Phyllospadix* spp.)
8	Sea lettuce (*Ulva* spp.)
9	Seagrasses (*Phyllospadix* spp.)
10	Feather boa kelp (*Egregia* spp.)

INVERTEBRATES (50 through 99)

50	Crabs
51	Mussels (*Mytilus* spp.)
52	Oysters
53	Scallops
54	Clams
55	Abalone (*Haliotis* spp.)
56	Shrimp
57	Worms
58	Dungeness crab (*Cancer magister*)
59	Spider crab (*Loxorhynchus crispatus*)
60	Kelp crab (*Pugettia* spp.)
61	Blue mussel (*Mytilus edulis*)
62	California mussel (*Mytilus californianus*)
63	Pacific oyster (*Crassostrea gigas*)
64	Olympia oyster (*Ostrea lurida*)
65	Weathervane scallop (*Pecten* spp.)
66	Rock scallop (*Hinnites multirugosus*)
67	Basket cockle (*Clinocardium nuttallii*)
68	Butter clam (*Saxidomus giganteus*)
69	Gaper clam (*Tresus* spp.)
70	Soft-shelled clam (*Mya arenaria*)
71	Common littleneck clam (*Protothaca staminea*)
72	Razor clam (*Siliqua patula*)
73	Geoduck clam (*Panopea generosa*)
74	Pismo clam (*Tivela stultorum*)
75	Red abalone (*Haliotis rufescens*)
76	Black abalone (*Haliotis cracherodii*)
77	Pink abalone (*Haliotis corrugata*)
78	Green abalone (*Haliotis fulgens*)
79	White abalone (*Haliotis sorenseni*)
80	Bay shrimp (*Crangon* spp.)
81	Ghost shrimp (*Callianassa californiensis*)
82	Ocean pink shrimp (*Pandalus jordani*)
83	Spot prawn (*Pandalus platyceros*)
84	Spiny lobster (*Panulirus interruptus*)
85	Squid (*Loligo opalescens*)
86	Octopus (*Octopus* spp.)
87	Sea urchin (*Strongylocentrotus* spp.)
88	Crayfish (*Pacifastacus leniusculus*)
89	Purple coral (*Allopora californica*)
90	Sand shrimp (*Crangon franciscorum*)
S 91	California freshwater shrimp (*Syncaris pacifica*)
92	Amphipods (*Corophium*, *Eogammarus*)
93	Piddock (*Penitella* spp.)
94	Flat abalone (*Haliotis walallensis*)
95	Mud shrimp (*Upogebia pugettensis*)

FISH (100 through 299)

100	Salmonids (*Oncorhynchus* spp.)
101	Flatfish (*Pleuronectiformes*)
102	Rockfish (*Sebastes* spp.)
103	Codfish (*Gadidae*)
104	Chinook salmon (*Oncorhynchus tshawytscha*)
105	Coho salmon (*Oncorhynchus kisutch*)
106	Chum salmon (*Oncorhynchus keta*)
107	Pink salmon (*Oncorhynchus gorbuscha*)
108	Sockeye salmon (*Oncorhynchus nerka*)
109	Steelhead trout (*Salmo gairdneri*)
110	Dolly Varden (*Salvelinus malma*)
111	Starry flounder (*Platichthys stellatus*)
112	English sole (*Parophrys vetulus*)
113	Butter sole (*Isopsetta isolepis*)
114	Dover sole (*Microstomus pacificus*)
115	Rock sole (*Lepidopsetta bilineata*)
116	Sand sole (*Psettichthys melanostictus*)
117	Rex sole (*Glyptocephalus zachirus*)
118	Petrale sole (*Eopsetta jordani*)
119	Pacific halibut (*Hippoglossus stenolepis*)
120	California halibut (*Paralichthys californicus*)
121	Speckled sanddab (*Citharichthys stigmaeus*)
122	Arrowtooth flounder (*Atheresthes stomias*)
123	Lingcod (*Ophiodon elongatus*)
124	Pacific tomcod (*Microgadus proximus*)
125	Pacific cod (*Gadus macrocephalus*)
126	Shiner perch (*Cymatogaster aggregata*)

continued

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Table 2 (continued).

	127	Pacific ocean perch (*Sebastes alutus*)
	128	Pile perch (*Rhacochilus vacca*)
	129	Sharks (Chondrichthyes)
	130	Rays (Rajiformes)
	131	Smelts (Osmeridae)
	132	Topsmelt (*Atherinops affinis*)
	133	California grunion (*Leuresthes tenuis*)
	134	White seabass (*Atractoscion nobilis*)
	135	Striped bass (*Morone saxatilis*)
	136	Sea basses (Serranidae)
	137	Kelp bass (*Paralabrax clathratus*)
	138	Giant sea bass (*Stereolepis gigas*)
	139	Barred sand bass (*Paralabrax nebulifer*)
	140	Mackerels (Scombridae)
	141	Chub mackerel (*Scomber japonicus*)
	142	Jack mackerel (*Trachurus symmetricus*)
	143	Tunas (Scombridae)
	144	Yellowfin tuna (*Thunnus albacares*)
	145	Skipjack tuna (*Euthynnus pelamis*)
	146	Pacific bonito (*Sarda chiliensis*)
	147	Albacore (*Thunnus alalunga*)
	148	Yellowtail (*Seriola lalandei*)
	149	Pacific lamprey (*Lampetra tridentata*)
	150	River lamprey (*Lampetra ayresi*)
	151	Sturgeon (*Acipenser* spp.)
	152	Green sturgeon (*Acipenser medirostris*)
	153	White sturgeon (*Acipenser transmontanus*)
	154	American shad (*Alosa sapidissima*)
	155	Mountain whitefish (*Prosopium williamsoni*)
	156	Pacific herring (*Clupea harengus pallasi*)
	157	Sculpins (Cottidae)
	158	Cabezon (*Scorpaenichthys marmoratus*)
	159	Threespine stickleback (*Gasterosteus aculeatus*)
	160	Spiny dogfish (*Squalus acanthias*)
	161	Longjaw mudsucker (*Gillichthys mirabilis*)
	162	Ocean whitefish (*Caulolatilus princeps*)
	163	Northern anchovy (*Engraulis mordax*)
	164	Pacific hake (*Meriuccius productus*)
	165	Eulachon (*Thaleichthys pacificus*)
	166	Pacific sierra (*Scomberomorus sierra*)
	167	Swordfish (*Xiphias gladius*)
	168	Pacific barracuda (*Sphyraena argentea*)
	169	California sheephead (*Semicossyphus pulcher*)
	170	Croakers (Sciaenidae)
	171	Eels (Anguilliformes)
	172	Dolphin (*Coryphaena hippurus*)
	173	Garibaldi (*Hypsypops rubicundus*)
	174	Pacific sardine (*Sardinops sagax*)
	175	Rainbow trout (*Salmo gairdneri*)
	176	Olympic mudminnow (*Novumbra hubbsi*)
	177	Cutthroat trout (*Salmo clarki*)
	178	Striped mullet (*Mugil cephalus*)
	179	Surfperches (Embiotocidae)
F	180	Unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*)
	181	Sunfish (Centrarchidae)
	182	Catfish (*Ictalurus* spp.)
		REPTILES AND AMPHIBIANS (300 through 349)
F	300	Green sea turtle (*Chelonia mydas*)
F	301	Leatherback sea turtle (*Dermochelys coriacea*)
F	302	Pacific Ridley sea turtle (*Lepidochelys olivacea*)
		MAMMALS (350 through 399)
	350	Northern fur seal (*Callorhinus ursinus*)
	351	California sea lion (*Zalophus californianus*)
	352	Steller sea lion (*Eumetopias jubatus*)
	353	Harbor seal (*Phoca vitulina*)
	354	Northern elephant seal (*Mircunga angustirostris*)
F	355	Gray whale (*Eschrichtius robustus*)
	356	Killer whale (*Orcinus orca*)
F	357	Right whale (*Balaena glacialis*)
	358	Minke whale (*Balaenoptera acutorostrata*)
F	359	Sei whale (*Balaenoptera borealis*)
F	360	Finback whale (*Balaenoptera physalus*)
F	361	Humpback whale (*Megaptera novaeangliae*)
F	362	Blue whale (*Balaenoptera musculus*)
F	363	Sperm whale (*Physeter macrocephalus*)
	364	Dall porpoise (*Phocoenoides dallii*)
	365	Striped dolphin (*Stenella coeruleoalba*)
	366	Pacific white-sided dolphin (*Lagenorhynchus obliquidens*)
	367	Common dolphin (*Delphinus delphis*)
	368	Pygmy sperm whale (*Kogia breviceps*)
F	369	Southern sea otter (*Enhydra lutris nereis*)
	370	Guadalupe fur seal (*Arctocephalus townsendi*)
	371	Pilot whale (*Globicephala macrorhynchus*)
	372	Harbor porpoise (*Phocoena phocoena*)
	373	Northern right whale dolphin (*Lissodelphis borealis*)
	374	Bottlenose dolphin (*Tursiops truncatus*)
	375	Northern sea otter (*Enhydra lutris lutris*)

continued

Table 2 (continued).

TERRESTRIAL ORGANISMS

PLANTS (400 through 499)

S	400	Madder family (Rubiaceae)
S	401	Carrot family (Apiaceae)
S	402	Aster family (Asteraceae)
S	403	Barberry family (Berberidaceae)
S	404	Borage family (Boraginaceae)
F,S	405	Mustard family (Brassicaceae)
F,S	406	Stonecrop family (Crassulaceae)
S	407	Cypress family (Cupressaceae)
F,S	408	Figwort family (Scrophulariaceae)
F,S	409	Heath family (Ericaceae)
F,S	410	Pea family (Fabaceae)
S	411	Waterleaf family (Hydrophyllaceae)
F,S	412	Mint family (Lamiaceae)
S	413	Lily family (Liliaceae)
S	414	False mermaid family (Limnanthaceae)
F,S	415	Mallow family (Malvaceae)
F,S	416	Evening-primrose family (Onagraceae)
S	417	Grass family (Poaceae)
S	418	Buckwheat family (Polygonaceae)
F,S	419	Crowfoot family (Ranunculaceae)
S	420	Buckthorn family (Rhamnaceae)
S	421	Rose family (Rosaceae)
	422	Western redcedar (*Thuja plicata*)
	423	Douglas fir (*Pseudotsuga menziesii*)
	424	Redwood (*Sequoia sempervirens*)
	425	Torrey pine (*Pinus torreyana*)
	426	Pygmy forest
	427	Coniferous forest

INVERTEBRATES (500 through 549)

F	500	Mission blue butterfly (*Icaricia icarioides missionensis*)
F	501	Lotis blue butterfly (*Lycaeides argyrognomon lotis*)
F	502	Palos Verdes blue butterfly (*Glaucopsyche lygdamus palosverdesensis*)
F	503	El Segundo blue butterfly (*Euphilotes battoides allyni*)
F	504	Smith's blue butterfly (*Euphilotes enoptes smithi*)
F	505	San Bruno elfin butterfly (*Callophrys mossii bayensis*)
F	506	Lange's metalmark butterfly (*Apodemia mormo langei*)
	507	Monarch butterfly (*Danaus plexippus*)
F	508	Oregon silverspot butterfly (*Speyeria zerene hippolyta*)
F	509	Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)

BIRDS (550 through 849)

	550	Shorebirds (550 through 599)
	551	Jaegers (*Stercorarius* spp.)
	552	Gulls (*Larinae*)
	553	Terns (*Sterninae*)
	554	Black oystercatcher (*Haematopus bachmani*)
	555	Snowy plover (*Charadrius alexandrinus*)
	556	Sandpipers (Calidridinae)
	557	American avocet (*Recurvirostra americana*)
	558	Black-necked stilt (*Himantopus mexicanus*)
	559	Phalaropes (Phalaropodidae)
	560	Northern phalarope (*Lobipes lobatus*)
	561	Western gull (*Larus occidentalis*)
	562	Heermann's gull (*Larus heermanni*)
	563	Forster's tern (*Sterna forsteri*)
F	564	California least tern (*Sterna albifrons browni*)
	565	Elegant tern (*Sterna elegans*)
	566	Caspian tern (*Sterna caspia*)
	567	Black skimmer (*Rynchops niger*)
	568	Willet (*Catoptrophorus semipalmatus*)
	569	Marbled godwit (*Limosa fedoa*)
	570	Turnstones (*Arenaria* spp.)
	571	Plovers (Charadriinae)
	572	Yellowlegs (*Totanus* spp.)
	573	Glaucous-winged gull (*Larus glaucescens*)
	600	Wading birds (600 through 649)
	601	Herons (Ardeinae)
	602	Egrets (Ardeinae)
	603	Bitterns (Botaurinae)
	604	Rails (Rallinae)
	605	White-faced ibis (*Plegadis chihi*)
F	606	California clapper rail (*Rallus longirostris obsoletus*)
F	607	Light-footed clapper rail (*Rallus longirostris levipes*)
S	608	California black rail (*Laterallus jamaicensis coturniculus*)
	609	Great blue heron (*Ardea herodias*)
	610	Black-crowned night heron (*Nycticorax nycticorax*)
	611	Wood stork (*Mycteria americana*)
	612	Sandhill crane (*Grus canadensis*)
	650	Waterfowl (650 through 699)
	651	Loons (Gaviidae)
	652	Grebes (Podicipedidae)
	653	Swans (Cygninae)
	654	Geese (Anserinae)
	655	Dabbling ducks (Anatinae)
	656	Diving ducks (Aythyinae)

continued

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Table 2 (continued).

657 Sea ducks (Aythyinae)
658 Mergansers (Merginae)
F 659 Aleutian Canada goose (*Branta canadensis leucopareia*)
660 Brant (*Branta bernicla*)
661 Canada goose (*Branta canadensis*)
662 American wigeon (*Anas americana*)
663 Pintail (*Anas acuta*)
664 Mallard (*Anas platyrhynchos*)
665 Canvasback (*Aythya valisineria*)
666 Whistling swan (*Olor columbianus*)
667 Trumpeter swan (*Olor buccinator*)
668 Harlequin duck (*Histrionicus histrionicus*)
669 Barrow's goldeneye (*Bucephala islandica*)

700 Raptors (700 through 749)
701 Vultures (Cathartidae)
702 Hawks (Buteoninae)
703 Eagles (Buteoninae)
704 Falcons (Falconinae)
705 Owls (Strigiformes)
F 706 California condor (*Gymnogyps californianus*)
707 White-tailed kite (*Elanus leucurus*)
F 708 Bald eagle (*Haliaeetus leucocephalus*)
709 Osprey (*Pandion haliaetus*)
F 710 American peregrine falcon (*Falco peregrinus anatum*)
711 Spotted owl (*Strix occidentalis*)
712 Golden eagle (*Aquila chrysaetos*)
713 Burrowing owl (*Athene cunicularia*)
714 Snowy owl (*Nyctea scandiaca*)

750 Seabirds (750 through 799)
751 Albatrosses (*Diomedae* spp.)
752 Shearwaters (*Puffinus* spp.)
753 Storm petrels (Hydrobatidae)
754 Cormorants (*Phalacrocorax* spp.)
755 Alcids (Alcidae)
756 Northern fulmar (*Fulmarus glacialis*)
757 Fork-tailed storm petrel (*Oceanodroma furcata*)
758 Leach's storm petrel (*Oceanodroma leucorhoa*)
759 Ashy storm petrel (*Oceanodroma homochroa*)
760 Black storm petrel (*Oceanodroma melania*)
F 761 California brown pelican (*Pelecanus occidentalis californicus*)
762 Double-crested cormorant (*Phalacrocorax auritus*)
763 Brandt's cormorant (*Phalacrocorax penicillatus*)
764 Pelagic cormorant (*Phalacrocorax pelagicus*)
765 Common murre (*Uria aalge*)
766 Pigeon guillemot (*Cepphus columba*)
767 Marbled murrelet (*Brachyramphus marmoratus*)
768 Xantus' murrelet (*Endomychura hypoleuca*)
769 Cassin's auklet (*Ptychoramphus aleuticus*)
770 Rhinoceros auklet (*Cerorhinca monocerata*)
771 Tufted puffin (*Lunda cirrhata*)
772 White pelican (*Pelecanus erythrorhynchos*)

800 Songbirds and others (800 through 849)
801 Non-passerines
802 Quail (Odontophorinae)
803 Grouse (Tetraonidae)
804 Doves (Columbinae)
805 Woodpeckers (Picinae)
806 Passerines (Passeriformes)
807 Flycatchers (Tyrannidae)
808 Bluebirds (*Sialia* spp.)
809 Warblers (Parulidae)
810 Turkey (*Meleagris gallopavo*)
811 Chukar (*Alectoris chukar*)
812 Ring-necked pheasant (*Phasianus colchicus*)
F 813 San Clemente loggerhead shrike (*Lanius ludovicianus mearnsi*)
S 814 Least Bell's vireo (*Vireo bellii pusillus*)
S 815 Belding savannah sparrow (*Passerculus sandwichensis beldingi*)
F 816 San Clemente sage sparrow (*Amphispiza belli clementeae*)
817 Black swift (*Cypseloides niger*)
818 Bank swallow (*Riparia riparia*)

REPTILES AND AMPHIBIANS (850 through 899)

850 Red-legged frog (*Rana aurora*)
851 California tiger salamander (*Ambystoma californiense*)
F 852 Santa Cruz long-toed salamander (*Ambystoma macrodactylum croceum*)
853 Coast horned lizard (*Phrynosoma coronatum*)
F 854 Island night lizard (*Xantusia riversiana*)
855 Orangethroat whiptail (*Cnemidophorus hyperythrus*)
856 Black legless lizard (*Anniella pulchra nigra*)
F 857 San Francisco garter snake (*Thamnophis sirtalis tetrataenia*)
S 858 Alameda striped racer (*Masticophis lateralis euryxanthus*)
859 Pacific giant salamander (*Dicamptodon ensatus*)

continued

Table 2 (concluded).

MAMMALS (900 through 999)

	900	Rabbits and hares (Leporidae)
	901	Marmots (*Marmota* spp.)
	902	Squirrels (Sciuridae)
	903	Chipmunks (*Eutamias* spp.)
	904	Suisun shrew (*Sorex sinuosus*)
	905	Mountain beaver (*Aplodontia rufa*)
F	906	Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*)
	907	Beaver (*Castor canadensis*)
F	908	Salt-marsh harvest mouse (*Reithrodontomys raviventris*)
	909	Red fox (*Vulpes vulpes*)
	910	Gray fox (*Urocyon cinereoargenteus*)
S	911	Insular gray fox (*Urocyon littoralis*)
	912	Black bear (*Ursus americanus*)
	913	Ringtail (*Bassariscus astutus*)
	914	Raccoon (*Procyon lotor*)
	915	River otter (*Lutra canadensis*)
	916	Mountain lion (*Felis concolor*)
	917	Bobcat (*Felis rufus*)
	918	Wild boar (*Sus scrofa*)
	919	Elk (*Cervus elaphus*)
	920	Mule deer (*Odocoileus hemionus*)
F	921	Columbian white-tailed deer (*Odocoileus virginianus leucurus*)
	922	Badger (*Taxidea taxus*)
	923	Mountain goat (*Oreamnos americanus*)
	924	Black-tailed deer (*Odocoileus hemionus columbianus*)
	925	Tule elk (*Cervus nannodes*)

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*F = Federally listed threatened or endangered species.

S = State-listed threatened or endangered species.

F,S = Federally and state-listed threatened or endangered species are assigned the same species number.

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indicated on the maps, depending on their size and their economic, ecological, or scientific importance. The species, habitat, and status designations have been depicted by a combination of symbols keyed to alphanumeric descriptors and color. A list of the depicted aquatic and terrestrial species and their identifying numbers is shown on each map.

The data are only as reliable as the source material. Certain information was not included on the maps if reports were not readily available, if the reports contained proprietary information, if the data were ambiguous, or if the source material was difficult to obtain. Because of time constraints, a comprehensive review of published and unpublished reports was not possible. Nonetheless, the information presented on the inventory maps and in this report represents the most reliable information available as of February 1981 for the entire Pacific coastal zone.

2.4 INVENTORY GRAPHICS

2.4.1 The Maps and Grid System

The base maps used in this study are the United States Geological Survey (USGS) National Topographic Map series with a scale of 1:250,000. These maps contain the Universal Transverse Mercator (UTM) grid system. The 30 Pacific coast ecological inventory maps are shown in Figure 3 and listed in Table 3.

The 10,000-meter centered UTM grid system is used on the maps as an aid in locating specific point and area features. The UTM west-east grid lines are employed to great advantage in describing the biological resources along the north-south trending Pacific coastline.

Instructions on how to use the UTM system are found in the User's Guide (part 3) of this report and on the legend of each map. Standard alphanumeric coding is employed to identify the geographic location of specific points.

2.4.2 Cartographic Discussion

USGS supplied the separation plates for each of the base map sheets used in this study. Each map sheet generally consists of a series of separation plates that show drainage, open water, contour, road, and cultural features. The individual separation plates composing each base map were aligned and pin registered before being used for the inventory graphics. A black and white composite of each base map was reproduced on stable base mylar. These individual prepunched mylar maps then were used as the data base during the synthesis and compilation of the biological and land use resources of the study region. Special land use delineations were compiled directly on the mylar base. The terrestrial and aquatic resources were compiled on separate mylar overlays and pin registered to each of the mylar base maps.

The cartographic effort involved a series of coordinated tasks leading to the production of 30 color-coded maps showing the ecological resources of the Pacific coast. The tasks included negative engraving (scribing process), preparation of negative open windows (peel coat process), composition of type nomenclature, placement of type, and photo laboratory processing.

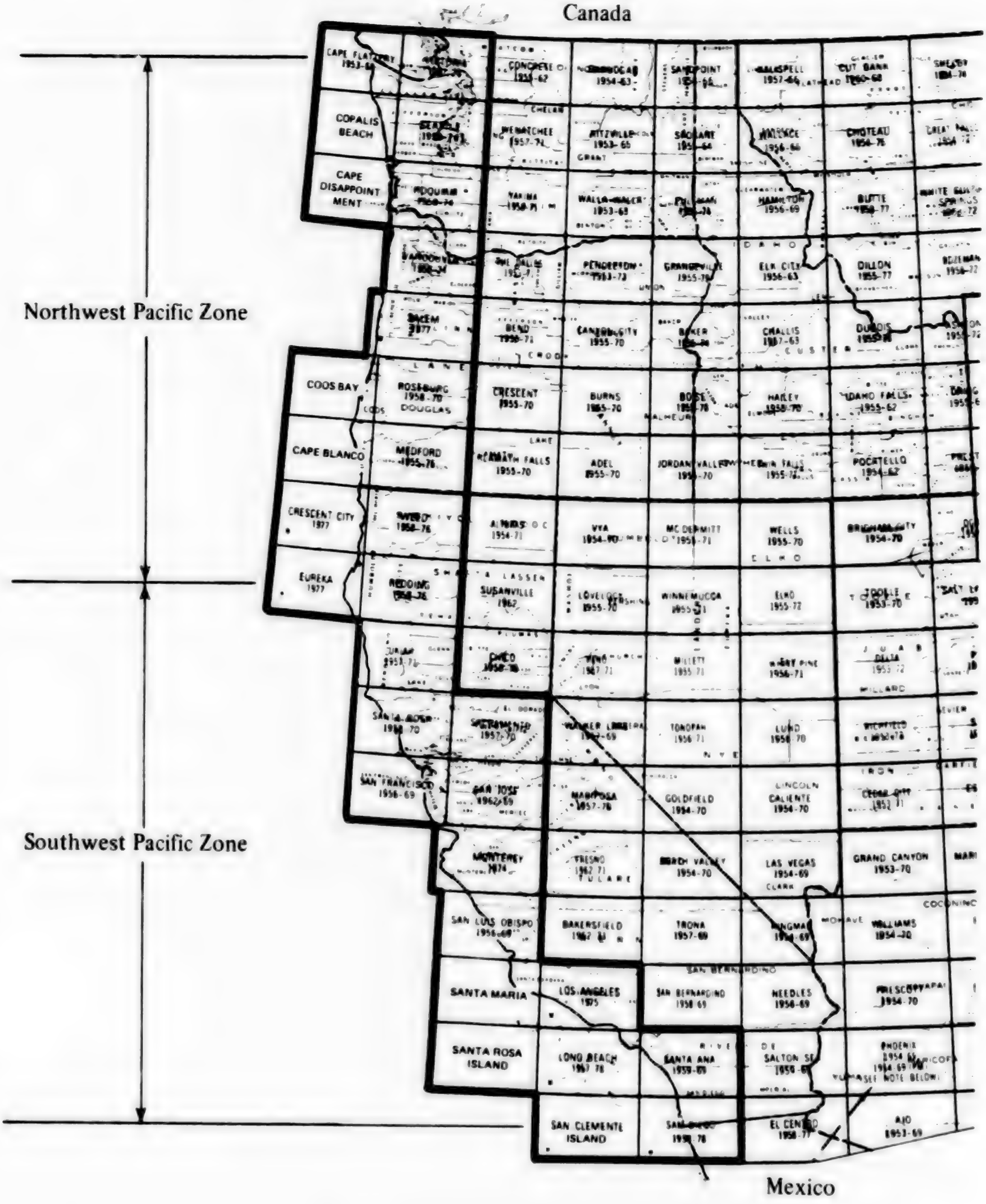

Figure 3. Index to USGS map sheets (scale 1:250,000) and major zones of the Pacific coast ecological inventory.

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Table 3. USGS maps (1:250,000) used in the Pacific coast ecological inventory and corresponding Terrell zones and sections.

		Southwest Pacific Zone			Northwest Pacific Zone		
	State	Southern California Coast	Central California Coast	San Francisco Bay	Pacific Northwest Coast	Columbia River Estuary	Puget Sound
San Diego	CA	X					
San Clemente Island	CA	X					
Santa Ana	CA	X					
Long Beach	CA	X					
Santa Rosa Island	CA	X					
Los Angeles	CA	X					
Santa Maria	CA	X	X				
San Luis Obispo	CA		X				
Monterey	CA		X				
San Jose	CA		X	X			
San Francisco	CA		X	X			
Sacramento	CA		X	X			
Santa Rosa	CA		X	X			
Ukiah	CA		X				
Redding	CA		X		X		
Eureka	CA		X		X		
Weed	CA-OR				X		
Crescent City	CA-OR				X		
Medford	OR-CA				X		
Cape Blanco	OR				X		
Roseburg	OR				X		
Coos Bay	OR				X		
Salem	OR				X		
Vancouver	WA-OR				X	X	
Cape Disappointment	WA-OR				X	X	
Hoquiam	WA-OR				X	X	
Copalis Beach	WA				X		
Seattle	WA				X		X
Cape Flattery	WA				X		X
Victoria	WA				X		X

All linework and map unit boundaries were prepared by scribing to ensure consistent line weights and close tolerance. The resulting scribe plates subsequently were used to make press-ready negatives for printing by contact photographic methods. In addition, the scribe plates provided the capability for applying special colors to specific map unit boundaries. For example, this process made it possible to separate and portray aquatic map unit boundaries in blue, terrestrial map unit boundaries in brown, and species with special status map unit boundaries in red. The peel coat process allowed large areas to be portrayed with special tints. For example, yellow highlights the study area limits, and light green shows the extent of special land use areas.

Each map sheet contains an average of 14 separate pin-registered flats--a single flat represents a specific set of similar items, such as base map information, symbols, patterns, linework, and nomenclature. Flats with the same color code were combined and photographed individually to produce a final press-ready negative. A total of five press-ready negatives were produced for each map sheet; each negative represents one of the five colors depicted on the map. The press-ready negatives subsequently were placed into a frame collar prior to printing.

2.4.3 Inventory Map Development

The inventory maps are the major data source for the location of important biological and ecological resources along the Pacific coast. Prior to preparing the final set of inventory maps, two segments along the Pacific coast were selected for trial graphics: the Columbia River and San Francisco Bay areas. The 1:250,000-scale quadrangles covering Hoquiam, WA-OR, and San Francisco, CA, were used. Sample color-coded maps were submitted to FWS for review and comments.

The final inventory graphics were prepared after draft copies of the inventory graphics were reviewed by various field offices of Federal, state, and local agencies. The respective comments on the accuracy and reliability of the mapped resource data were evaluated and screened prior to incorporating the suggestions onto the appropriate draft compilation manuscript. The individual map sheets then were revised and format registered prior to the preparation of press-ready negatives.

2.5 LIST OF SOURCES FOR COMMON AND SCIENTIFIC SPECIES NAMES

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PART 3

USER'S GUIDE

3.1 THE INVENTORY MAPS

The purpose of the inventory maps is to provide basic information on the biological and land use resources of the Pacific coast. The maps are intended to assist the user in the initial planning of energy facilities by showing the location and occurrence of important fish and wildlife species and highlighting the location of special land use areas in the Pacific coastal zone.

The inventory maps have been designed so that they can be used either independently or in association with this report. However, for best results, the user should consult the narrative report during his or her review of the inventory maps.

The frame portion of each map contains a comprehensive legend and supplemental information, showing symbols, colors, patterns and lines, and alphanumeric descriptors, each representing a specific biological resource, habitat, or special land use feature. The base map information from the standard 1:250,000-scale National Topographic Map Series also has been retained for this inventory. Table 4 summarizes the types of cultural and ecological information shown on the inventory maps.

3.2 HOW TO USE THE INVENTORY MAPS

The inventory maps are multipurpose in scope and cover many aspects of the biological environment of the Pacific coastal zone. The reader should pay attention to the legend and explanatory text while using the inventory maps.

For ease of identification, the inland and seaward boundaries of the coastal zone are framed by a wide hatched line pattern; the inland or land portions of the coastal zone are printed in yellow, and the seaward or water portions of the coastal zone are printed in light blue. These boundaries compose the limits of the study area, as defined by the Pacific coast ecological inventory.

The ecological information shown on the inventory maps may be divided into three general categories (see Table 4): land use/land cover, aquatic organisms, and terrestrial organisms. Figure 4 is a portion of the Ukiah, California, sheet reproduced in black and white.

3.2.1 Land Use/Land Cover

Special land use areas, such as national wildlife refuges, national parks, state parks, and state wildlife management areas, always are shown with a gray boundary and light green tint. Depending upon its size, a special land

Table 4. Summary of information shown on Pacific coast ecological inventory maps.

Base Map

- Water features (oceans, lakes, rivers, canals)
- Cultural features (roads, railroads, airfields, civil boundaries)
- Cartographic information (map sheet name, scale, location diagram, UTM grid system)

Land Use/Land Cover

- Study area (coastal zone boundary to three-mile limit)
- Special land use areas (refuges, wildlife management areas, national or state parks, etc.)
- Swamp
- Marsh
- Beach/Dunes
- Seagrass

Aquatic Organisms

- Estuarine and riverine areas, indicated by lines depicting high-, mid-, and low-salinity, and freshwater habitats
- Point and area boundaries showing location and concentrations of aquatic organisms, including species that are threatened or endangered
- Symbol, number, and letter designators identifying general class, species or group, and habitat use for aquatic organisms
- Comprehensive species list keyed to five general classes of aquatic organisms (plants, invertebrates, fish, reptiles and amphibians, and mammals)

Terrestrial Organisms

- Point and area boundaries showing locations and concentrations of terrestrial organisms, including species that are threatened or endangered

continued

Table 4 (concluded).

Terrestrial Organisms (cont'd)

- Symbol, number, and letter designators identifying general class, species or group, and habitat use for terrestrial organisms
- Comprehensive species list keyed to five general classes of terrestrial organisms (plants, invertebrates, birds, reptiles and amphibians, and mammals), including six subclasses of birds (shorebirds, wading birds, waterfowl, raptors, seabirds, and songbirds and others)

Notebox

- Special explanatory text, appearing in the map area or frame border, which supplements the biological and land use information shown on the corresponding inventory map use area can appear as either a small circle centered over the area's location or as the official boundary of the area. A special land use area always is identified on the inventory maps by its official name, for example, Olympic National Park in Washington, Cape Lookout State Park in Oregon, and the Bolsa Chica Ecological Reserve in California.

Land cover features appearing on the inventory maps are swamps, marshes, beaches/dunes, seagrass beds, and reefs. Swamps and marshes are identified by screen patterns and overprinted with light blue. Beaches/dunes, seagrass beds, and reefs are depicted by individual patterns overprinted in gray.

3.2.2 Aquatic Organisms

Aquatic organisms are identified on the inventory maps by a variety of line widths, symbols, numbers, and letter designators. Aquatic organisms, including plants, invertebrates, fish, reptiles and amphibians, and mammals, usually are shown in blue unless the particular species has special status. Species with special status, that is, those species which are endangered or threatened, always are shown in red on the inventory maps.

Local concentrations of aquatic organisms are identified by a point feature (a solid dot of appropriate color); larger areas of concentration are delineated by an enclosed boundary; and estuarine and riverine habitats are differentiated by line symbols of varying widths. These line symbols can be solid, dashed, or dotted, depending upon the salinity range in an area. For example, a heavy solid line shown in an estuary signifies a high-salinity habitat; sequential dashed, narrow solid, and dotted lines indicate progressively lower salinity habitats. Point features, the boundary lines enclosing area features, and estuarine and riverine habitat line symbols are shown in blue, unless the particular species has special status, in which case the point or boundary line features always are highlighted in red.

The classification scheme used on the inventory maps to identify a specific aquatic species and its corresponding habitat use consists of a generalized pictorial symbol, a number, and one or more lowercase letters. The pictorial symbol denotes one of five general aquatic classes; the number refers to the individual species or group from the species list, which appears in the right-hand frame margin of each inventory map; and the lowercase letters (a through i) refer to the specific habitat use of the particular species.

A representative example, showing the manner in which this classification scheme is used on the maps to identify a specific aquatic species and its habitat use designation, is shown below (see also Figure 4).

Fish
Shown Species: chinook salmon
in ⬬ 104afg
Blue Habitat use: spawning ground, sport fishing area, migratory area

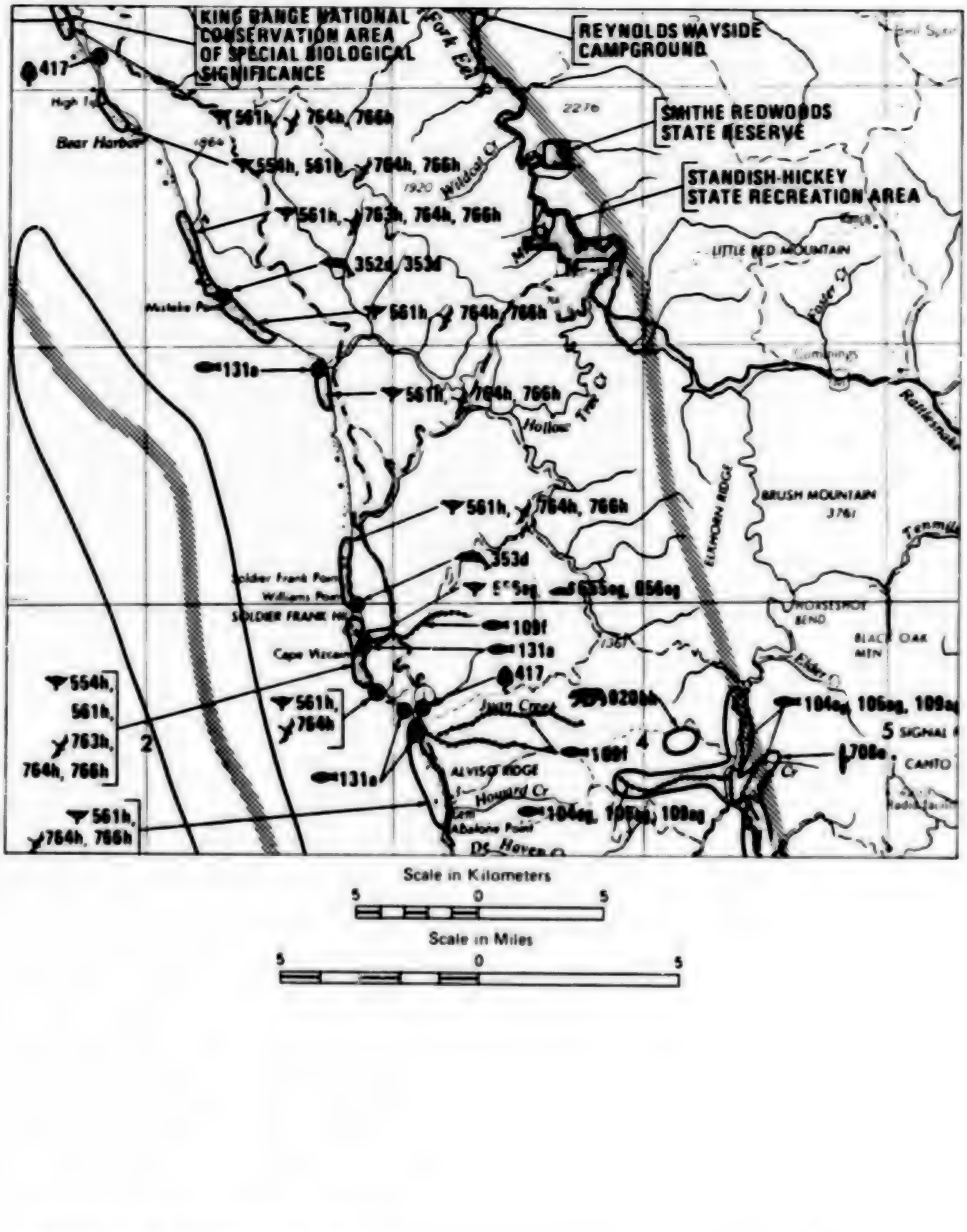

Figure 4. Portion of the Pacific coast ecological inventory map of Ukiah, California.

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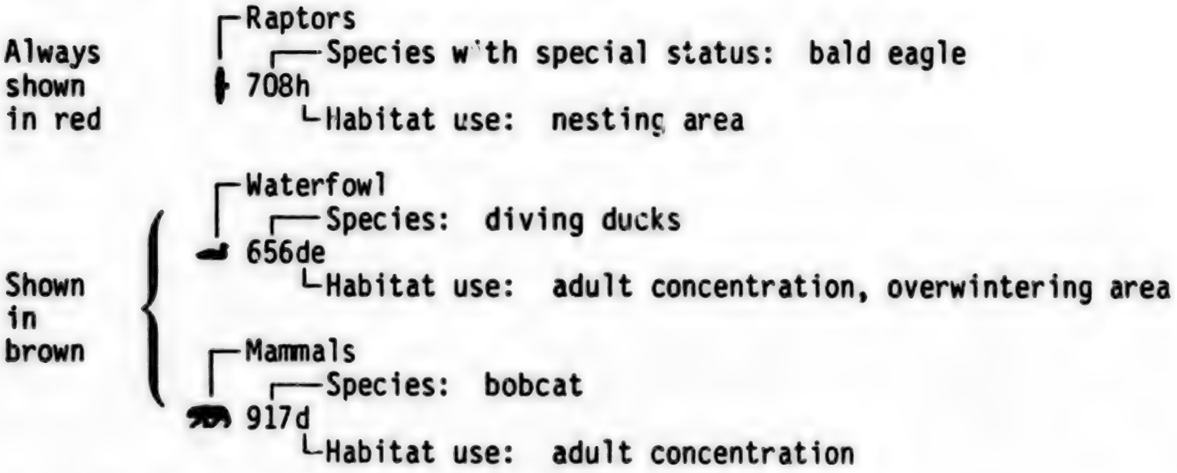
3.2.3 Terrestrial Organisms

Terrestrial symbols are identified on the inventory maps by a variety of symbols, numbers, and letter designators. Terrestrial organisms, including plants, invertebrates, birds, reptiles and amphibians, and mammals, usually are shown in brown unless the particular species has special status. Species with special status, that is, species which are endangered or threatened, are always shown in red on the inventory maps.

Local concentrations of terrestrial organisms are identified by a point feature (a solid dot of appropriate color); larger areas of concentration are delineated by an enclosed boundary. Point features and boundary lines enclosing area features are shown in brown, unless the particular species has special status, in which case the point or boundary line features always are highlighted in red.

The classification scheme used on the inventory maps to identify a specific terrestrial species and its corresponding habitat use consists of a generalized pictorial symbol, a number, and one or more lowercase letters. The pictorial symbol denotes one of four general terrestrial classes or six bird subclasses; the number refers to the individual species or group from the species list, which appears in the right-hand frame margin of each inventory map; and the lowercase letters (a through i) refer to the specific habitat use of the particular species.

Representative examples, showing the manner in which this classification scheme is used on the maps to identify a specific terrestrial species and its habitat, are shown below (see also Figure 4).


Always shown in red
Raptors
Species with special status: bald eagle
708h
Habitat use: nesting area
Waterfowl
Species: diving ducks
656de
Habitat use: adult concentration, overwintering area
Shown in brown
Mammals
Species: bobcat
917d
Habitat use: adult concentration

3.3 HOW TO USE THE GRID REFERENCE SYSTEM

Each inventory map contains the standard UTM grid system, made up of a network of 10,000-meter vertical and horizontal grid lines keyed to corresponding grid reference numbers. The legend block in the frame portion of each map identifies the map's grid zone designation, the 100,000-meter square identification for each map area, and a set of general instructions on how to use the UTM grid reference system.

In this inventory, the UTM grid reference system is used to identify the geographic location of biological resources. Specifically, the 10,000-meter grid lines, consisting of a series of alphanumeric reference points, provide the basic location system for describing the biological resources within discrete intervals, or swaths along the Pacific coast. The west-east or horizontal grid lines are used to subdivide sections of the north-south trending Pacific coast. Two horizontal grid lines define a swath generally perpendicular to the coast. The swath locates geographically the biological resources to be described. In a similar way, the north-south or vertical grid lines are used to define swaths across sections of coast which trend in an east-west direction. The UTM grid reference system has been used with Terrell's Level II regional classification scheme for Pacific coast ecosystems (Table 1 and Figure 2). The west-east grid lines are used to provide the basic reference system for describing the biological resources for the major portion of the coast; the north-south grid is used in the Columbia River Estuary and Puget Sound sections.

UTM grid locations are identified by their alphanumeric designators, consisting of two letters followed by two numbers (for example, grid reference GP62 or CJ76). The two letters of the grid reference designator identify the appropriate 100,000-meter square in which the biological resource occurs; the two numbers refine the location of the feature to the nearest 10,000-meter square. The first number identifies the north-south or vertical grid line; the second number designates the intersecting west-east or horizontal grid line. The vertical grid line always is located to the left, or west, of the feature being described; the intersecting horizontal grid line always is located below, or south, of the feature of interest.

Two representative examples on how to use the UTM grid reference system are presented below.

Example 1

Map: San Diego, CA
Species of interest: Green sea turtle
Identify appropriate 100,000-meter square (legend block): MG
Locate 10,000-meter vertical grid number (always to left of point): 8
Locate 10,000-meter horizontal grid number (always below point): 1

The location is identified in the report as grid reference MG81.

Example 2

Map: Long Beach, CA
The location is identified in report as: grid reference LH65
Consult UTM legend block to identify appropriate 100,000-meter square: LH
Locate 10,000-meter vertical grid number (always to left of point): 6
Locate 10,000-meter horizontal grid number (always below point): 5

The grid reference refers to the location of the only two colonies of El Segundo blue butterflies in the study area.

PART 4

SOUTHWEST PACIFIC ZONE
(GRID REFERENCE MF89 TO CV87)

4.1 INTRODUCTION

For best results, much of the preparatory information in parts 1, 2, and 3 should be read before using the maps or using the information in this part. This part presents some of the physiographic, land use, and geographic features of the Southwest Pacific Zone and the characteristics and habits of some of the major biological resources.

4.1.1 Physical Description

The Southwest Pacific Zone (Figure 5) constitutes approximately 40 percent of the study area and extends from the Mexican border to Cape Mendocino, California (grid reference MF89 to CV87). This zone is affected by the California Current and contains three subdivisions or sections: the Southern California Coast, the Central California Coast, and San Francisco Bay.

The ecological inventory of the Southwest Pacific Zone is covered by portions of the following USGS 1:250,000-scale maps:

- San Diego, CA
- San Clemente Island, CA
- Santa Ana, CA
- Long Beach, CA
- Santa Rosa Island, CA
- Los Angeles, CA
- Santa Maria, CA
- San Luis Obispo, CA
- Monterey, CA
- San Jose, CA
- San Francisco, CA
- Sacramento, CA
- Santa Rosa, CA
- Ukiah, CA
- Redding, CA
- Eureka, CA.

The coastline of the Southwest Pacific Zone is divided into two sections: the Southern California Coast and the Central California Coast. San Francisco Bay, although geographically part of the Central California Coast, is treated as a separate section. The Southern California Coast section, from the United States-Mexico border to Point Conception, California, has a semiarid climate and generally warmer waters than the rest of the coast. Water depths near the three-mile limit vary along the coast, averaging 75 meters (246 feet); depths

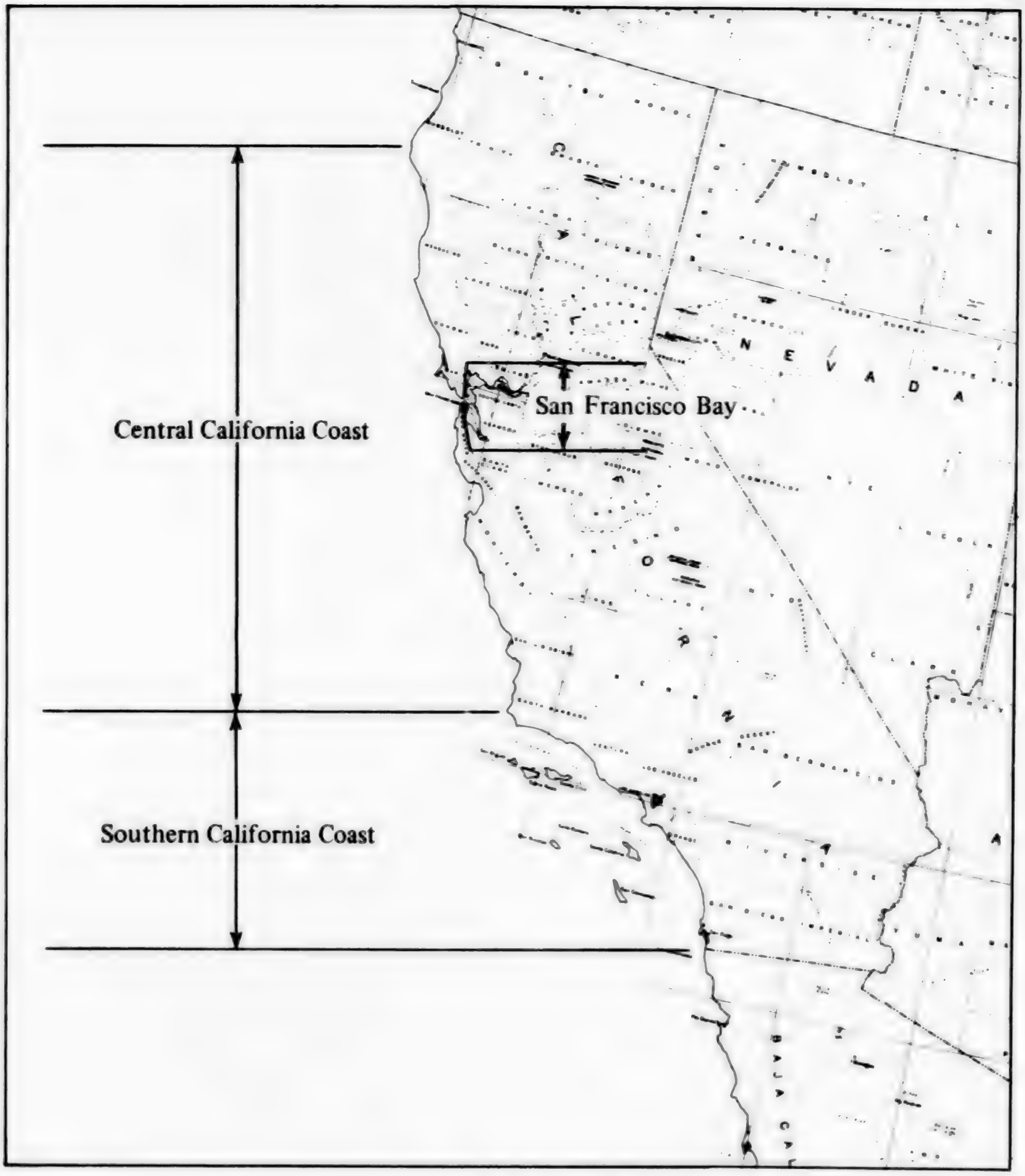


Figure 5. Major sections of the Southwest Pacific Zone.

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may reach 900 meters (2,953 feet) adjacent to offshore islands and 725 meters (2,379 feet) off the mainland. Most coastal rivers and creeks only flow following seasonal rainfall and freshwater inflow along the coast is small. The coastline of this section is characterized by long stretches of sandy beaches interspersed with rocky headlands; upland areas are characterized by chaparral-covered slopes. Several large urban areas occupy much of the coastline from San Diego to Santa Barbara. The Channel Islands are a major offshore feature of this section, stretching from below the United States-Mexico border north to Santa Barbara.

The Central California Coast section, from Point Conception to Cape Mendocino, California, varies considerably in climate from south to north, but generally has a mild, temperate climate. Point Conception is an area of major faunal change caused to a large extent by warmer waters to the south and colder waters to the north. Ocean depths along this section of coastline average less than 75 meters (246 feet) within the three-mile limit, but vary considerably and may reach 600 meters (1,968 feet). Freshwater inflow to this coast occurs mainly from the Sacramento River, which empties into San Francisco Bay. Many of the smaller rivers in this section flow seasonally, with a bar forming at their mouths during the summer months. The coastline of this section is characterized by long stretches of sandy beaches interspersed with rocky headlands in the southern portion and a predominantly high-cliffed, rocky coastline with small pocket beaches in the northern portion; several major estuaries occur along the coast. Upland areas vary from chaparral-covered slopes in the south to redwood forests in the north. The Monterey and San Francisco metropolitan areas are the only large urban areas along the central California coast.

4.1.2 Special Land Use Areas

The coastal area of the Southwest Pacific Zone is composed of both densely populated, highly urbanized areas such as Los Angeles and San Francisco and wild, undeveloped areas such as the Santa Lucia Range south of Monterey. Within this diverse area, a total of 223 special land use areas have been identified (Table 5).

Of these special land use areas, 21 are owned by the Federal Government, 178 are state owned, and the remaining 24 are operated by local or private organizations. Ventana Wilderness and Point Reyes Wilderness are designated as Class I air quality areas. Recreational significance can be attached to more than 75 percent of the areas, ranging from small state beaches to the vast Santa Monica Mountains National Recreation Area. Approximately 40 percent of the areas are significant for their natural qualities whether they be as extensive as Los Padres National Forest or as small as the Farnsworth Bank Ecological Reserve. In addition, approximately 10 percent of the areas have been denoted as having historic or cultural significance. Because of scale limitations, some of the historic sites in the urban areas of the Southwest Pacific Zone have not been shown on the maps.

4.2 RESOURCES OVERVIEW

The following paragraphs summarize the locations and habits of various species in the Southwest Pacific Zone. Only the more important species of the zone have been shown on the inventory maps due to scale limitations.

Table 5. Designated land use areas for the Southwest Pacific Zone.

	Ownership/Administration			Special significance		
Name	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
CALIFORNIA						
Border Field State Park		X				X
Tijuana Slough National Wildlife Refuge	X			X		
Silver Strand State Beach		X				X
Point Loma Ecological Reserve		X		X		
Cabrillo National Monument	X				X	X
Balboa Park			X			X
Old Town San Diego State Historic Park		X			X	X
San Diego - La Jolla Ecological Reserve and Area of Special Biological Significance		X		X		
San Diego Marine Life Refuge and Area of Special Biological Significance		X		X		
San Diego - La Jolla Underwater Park		X		X		X
Torrey Pines State Beach		X				X
Torrey Pines State Reserve		X		X		
San Clemente Island Area of Special Biological Significance		X		X		
Cardiff State Beach		X				X
San Elijo State Beach		X				X
Moonlight State Beach		X				X
Leucadia State Beach		X				X

continued

Table 5 (continued).

	Ownership/Administration			Special significance		
Name	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
CALIFORNIA (cont'd)						
South Carlsbad State Beach		X				X
Carlsbad State Beach		X				X
Buena Vista Lagoon Ecological Reserve		X		X		
San Onofre State Beach		X				X
San Clemente State Beach		X				X
Doheny Beach Marine Life Refuge		X		X		
Doheny State Beach		X				X
Dana Point Marine Life Refuge		X		X		
Niguel Marine Life Refuge		X		X		
South Laguna Beach Marine Life Refuge		X		X		
Heisler Park Ecological Reserve and Area of Special Biological Significance		X		X		
Laguna Beach Marine Life Refuge		X		X		
Irvine Coast Marine Life Refuge and Area of Special Biological Significance		X		X		
Crystal Cove State Beach		X				X
Newport Beach Marine Life Refuge and Area of Special Biological Significance		X		X		
Corona Del Mar State Beach			X			X
Upper Newport Bay Ecological Reserve		X		X		
Huntington State Beach		X				X

continued

Table 5 (continued).

Name	Ownership/Administration			Special significance		
	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
CALIFORNIA (cont'd)						
Bolsa Chica Ecological Reserve		X		X		
Bolsa Chica State Beach		X				X
Seal Beach National Wildlife Refuge	X			X		
Lover's Cove Reserve		X		X		
Santa Catalina Island - Subarea Four, Binnacle Rock to Jewfish Point Area of Special Biological Significance		X		X		
Farnsworth Bank Ecological Reserve and Santa Catalina Island - Subarea Three, Farnsworth Bank Ecological Reserve and Area of Special Biological Significance		X		X		
Santa Catalina Island - Subarea Two, North End of Little Harbor to Ben Weston Point Area of Special Biological Significance		X		X		
Santa Catalina Island - Subarea One, Isthmus Cove to Catalina Head Area of Special Biological Significance		X		X		
Channel Islands National Marine Sanctuary	X			X		
Santa Barbara Island Area of Special Biological Significance		X		X		

continued

Table 5 (continued).

	Ownership/Administration			Special significance		
Name	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
CALIFORNIA (cont'd)						
Channel Islands National Monument	X			X		X
Santa Barbara Island Ecological Reserve		X		X		
San Nicolas Island and Begg Rock Areas of Special Biological Significance		X		X		
Point Fermin Marine Life Refuge		X		X		
Royal Palms State Beach			X			X
Abalone Cove Ecological Reserve		X		X		
Redondo State Beach			X			X
Manhattan State Beach			X			X
Dockweiler State Beach			X			X
Santa Monica Mountains National Recreation Area	X			X		X
Santa Monica State Beach			X			X
Will Rogers State Beach			X			X
Will Rogers State Historic Park		X			X	X
Topanga State Park		X				X
Topanga State Beach			X			X
Las Tunas State Beach			X			X
Malibu Lagoon State Beach			X			X
Tapia County Park			X			X
Malibu Creek State Park		X				X
Corral State Beach		X				X
Point Mugu to Latigo Point Area of Special Biological Significance		X				X

continued

Table 5 (continued).

	Ownership/Administration			Special significance		
Name	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
CALIFORNIA (cont'd)						
Point Dume State Beach			X			X
Zuma County Beach			X			X
Charmlee County Park			X			X
Leo Carillo State Beach		X				X
Point Mugu State Park		X				X
Anacapa Island Ecological Reserve		X		X		
Anacapa Island Area of Special Biological Significance		X		X		
San Miguel, Santa Rosa, and Santa Cruz Islands Area of Special Biological Significance		X		X		
McGrath State Beach		X				X
San Buenaventura State Beach		X				X
Emma Wood State Beach		X				X
Carpenteria State Beach		X				X
Los Padres National Forest	X			X		X
El Presidio De Santa Barbara State Historic Park		X			X	
Chumash Painted Cave State Historic Park		X			X	
Goleta State Beach		X				X
San Miguel Island Ecological Reserve		X		X		
El Capitan State Beach		X				X
Refugio State Beach		X				X

continued

Table 5 (continued).

	Ownership/Administration			Special significance		
Name	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
CALIFORNIA (cont'd)						
Gaviota State Park		X				X
Point Sal State Beach			X			X
Pismo-Oceano Beach Pismo Clam Preserve		X		X		
Pismo State Beach		X				X
Pismo Dunes State Vehicular Recreation Area		X				X
Pismo Lake Ecological Reserve		X		X		
Pismo Invertebrate Reserve		X		X		
Avila State Beach			X			X
Los Osos Oaks State Reserve		X		X		
Montana De Oro State Park		X				X
Morro Beach Pismo Clam Preserve		X		X		
Morro Bay State Park		X		X		X
Morro Rock Ecological Reserve		X		X		
Atascadero Beach Pismo Clam Preserve		X		X		
Atascadero State Beach		X				X
Morro Strand State Beach		X				X
Cayucos State Beach			X			X
California Sea Otter Game Refuge		X		X		
San Simeon State Beach			X			X
William Randolph Hearst Memorial State Beach			X			X
Hearst San Simeon State Historical Monument		X			X	

continued

Table 5 (continued).

	Ownership/Administration			Special significance		
Name	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
CALIFORNIA (cont'd)						
Ocean Area Surrounding the Mouth of Salmon Creek Area of Special Biological Significance		X		X		
Ventana Wilderness*	X			X		X
John Little State Reserve		X		X		
Julia Pfeiffer Burns State Park		X				X
Julia Pfeiffer Burns Underwater Park and Area of Special Biological Significance		X		X		X
Pfeiffer Big Sur State Park		X		X		X
Andrew Molera State Park		X				X
Point Lobos State Reserve		X		X		
Point Lobos Ecological Reserve and Area of Special Biological Significance		X		X		
Carmel Bay Ecological Reserve and Area of Special Biological Significance		X		X		
Carmel River State Beach		X				X
Asilomar State Beach		X				X

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* Class I air quality area.

continued

Table 5 (continued).

Name	Ownership/Administration			Special significance		
	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
CALIFORNIA (cont'd)						
Pacific Grove Marine Gardens Fish Refuge and Area of Special Biological Significance		X		X		
Hopkins Marine Life Refuge and Area of Special Biological Significance		X		X		
Monterey State Historic Park		X			X	
Monterey State Beach		X				X
Marina State Beach		X				X
Salinas Wildlife Area		X		X		
Salinas River State Beach		X				X
Manzanita County Park			X			X
Royal Oaks County Park			X			X
Elkhorn Slough Estuarine Sanctuary	X			X		
Moss Landing State Beach		X				X
Zmudowski State Beach		X				X
Sunset State Beach		X				X
Manresa State Beach		X				X
Ellicott Slough National Wildlife Refuge	X			X		
Santa Cruz Long-Toed Salamander Ecological Reserve		X		X		
Seacliff State Beach		X				X
The Forest of Nisene Marks State Park		X				X

continued

Table 5 (continued).

	Ownership/Administration			Special significance		
Name	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
CALIFORNIA (cont'd)						
New Brighton State Beach		X				X
Capitola State Beach		X				X
Twin Lakes State Beach		X				X
De Laveaga Park			X			X
Santa Cruz Mission State Historic Park		X			X	
Natural Bridges State Beach		X		X		X
Henry Cowell Redwoods State Park		X		X		X
Big Basin Redwoods State Park		X		X		X
Año Nuevo Point and Island Area of Special Biological Significance		X		X		
Año Nuevo State Reserve		X		X		
Butano State Park		X				X
Bean Hollow State Beach		X				X
Pescadero State Beach		X				X
Pomponio State Beach		X				X
San Gregorio State Beach		X				X
San Francisco State Fish and Game Refuge		X		X		
Half Moon Bay State Beach		X				X
James V. Fitzgerald Marine Reserve		X		X		
James V. Fitzgerald Marine Reserve Area of Special Biological Significance		X		X		

continued

Table 5 (continued).

Name	Ownership/Administration: Federal	Ownership/Administration: State	Ownership/Administration: Private/ Local	Special significance: Natural/ Ecological	Special significance: Historic/ Cultural	Special significance: Recreational
CALIFORNIA (cont'd)						
Montara State Beach		X				X
Gray Whale Cove State Beach		X				X
Thornton State Beach		X				X
Golden Gate National Recreation Area	X			X	X	X
Golden Gate Park			X			X
Fort Point National Historic Site	X				X	
Redwood Shores Ecological Reserve		X		X		
San Francisco Bay National Wildlife Refuge	X			X		
John Muir National Historic Site	X				X	
Antioch Dunes National Wildlife Refuge	X			X		
Governor's Mansion		X			X	
Old Sacramento State Historic Park		X			X	
Sutter's Fort State Historic Park		X			X	
State Indian Museum		X			X	
Franks Tract State Recreation Area		X				X
Brannan Island State Recreation Area		X				X
Lower Sherman Island Wildlife Management Area		X		X		
Peytonia Slough Ecological Reserve		X		X		
Benicia Capitol State Historic Park		X			X	
Benicia State Recreation Area		X				X
Coon Island Ecological Reserve		X		X		
San Pablo Bay National Wildlife Refuge	X			X		

continued

Table 5 (continued).

Name	Ownership/Administration			Special significance		
	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
CALIFORNIA (cont'd)						
Petaluma Marsh State Wildlife Area		X		X		
San Pablo Bay Wildlife Area		X		X		
China Camp State Park		X				X
Corte Madera Ecological Reserve		X		X		
Angel Island State Park		X				X
Muir Woods National Monument	X			X		
Mount Tamalpais State Park		X		X		X
Farallon Islands Game Refuge and Areas of Special Biological Significance		X		X		
Farallon National Wildlife Refuge	X			X		
Point Reyes-Farallon Islands National Marine Sanctuary	X			X		
Duxbury Reef Reserve and Extension Area of Special Biological Significance		X		X		
Point Reyes National Seashore	X			X		X
Point Reyes Wilderness*	X			X		X
Point Reyes Headland Reserve and Extension Area of Special Biological Significance		X		X		
Samuel P. Taylor State Park		X		X		X
Estero de Limantour Reserve		X		X		
Tomales Bay Ecological Reserve		X		X		

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* Class I air quality area.

continued

Table 5 (continued).

	Ownership/Administration			Special significance		
Name	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
CALIFORNIA (cont'd)						
Tomales Bay State Park		X		X		X
Bird Rock Area of Special Biological Significance		X		X		
Bodega Marine Life Refuge and Area of Special Biological Significance		X		X		
Sonoma Coast State Beach		X				X
Armstrong Redwoods State Reserve		X		X		
Austin Creek State Recreation Area		X				X
Fort Ross State Historic Park		X			X	
Salt Point State Park		X				X
Gerstle Cove Reserve and Area of Special Biological Significance		X		X		
Kruse Rhododendron State Reserve		X		X		
Del Mar Landing Ecological Reserve and Area of Special Biological Significance		X		X		
Kelp Beds at Saunders Reef Area of Special Biological Significance		X		X		
Manchester State Beach		X				X
Paul M. Dimmick Wayside Campground		X				X
Van Damme State Park		X				X
Mendocino Headlands State Park		X				X
Russian Gulch State Park		X				X

continued

Table 5 (concluded).

	Ownership/Administration			Special significance		
Name	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
CALIFORNIA (cont'd)						
Caspar Headlands State Beach		X				X
Caspar Headlands State Reserve		X		X		
Point Cabrillo Reserve		X		X		
Jug Handle State Reserve		X		X		
Pygmy Forest Ecological Staircase Area of Special Biological Significance		X		X		
MacKerricher State Park		X				X
Westport-Union Landing State Beach		X				X
Standish-Hickey State Recreation Area		X				X
Smithe Redwoods State Reserve		X		X		
Reynolds Wayside Campground		X				X
King Range National Conservation Area		X		X		
King Range National Conservation Area of Special Biological Significance		X		X		

4.2.1 Species with Special Status

Species with special status shown on the accompanying inventory maps include only those known to occur in the Southwest Pacific Zone which are designated as either threatened or endangered on the Federal list and/or rare or endangered on the California State list (Table 6) and for which supporting data were available. Species proposed for consideration as endangered, threatened, rare, or other classification are discussed only when appropriate in the applicable aquatic or terrestrial sections of this report.

Species with special status that are known to occur in the Southwest Pacific Zone include 1 aquatic invertebrate, 1 fish, 3 aquatic reptiles, 8 marine mammals, 66 terrestrial plants, 8 terrestrial invertebrates, 13 birds, 4 terrestrial reptiles or amphibians, and 3 terrestrial mammals. Due to the large number of threatened or endangered terrestrial plant species in this zone, plants were mapped by family with specific species on each map indicated in the notebox. Terrestrial plant species with special status included within each family also are indicated in Table 7 and in the Appendix.

California freshwater shrimp (91) generally inhabit shallow pools in low elevation, low gradient streams with substrates of sand and gravel with some mud, silt, and organic debris. Spawning occurs in autumn and the young hatch the following May or early June. These shrimp are endemic to three counties in the Central California Coast and San Francisco Bay sections: Marin, Napa, and Sonoma.

The unarmored threespine stickleback (180) is a small, freshwater fish which inhabits low gradient, non-turbid, moving streams. It spawns as early as January, but usually from April to June; spawning occurs in back channels over soft bottom sediments. A stickleback population has been found in San Antonio Creek, Santa Barbara County, on Vandenberg Air Force Base.

Three turtle species with special status are summer visitors to the Southwest Pacific Zone, but are not known to nest there. The threatened green sea turtle (300) is migratory, inhabiting ocean waters, lagoons, and bays in temperate, tropical, and subtropical seas; it feeds on marine plants. Mating occurs in the water; females lay their eggs on sandy beaches in the spring.

The endangered leatherback sea turtle (301) is a pelagic species, inhabiting tropical and subtropical waters, occasionally venturing into temperate areas; it comes on land only to lay its eggs, usually in May or June. The threatened Pacific Ridley sea turtle (302) prefers bays, lagoons, and shallow water between reefs and the shore in the warmer waters of the Pacific Ocean. Females seek out sand beaches to lay their eggs. Pacific Ridley sea turtles feed on fish, crustaceans, molluscs, and sea urchins.

Seven endangered whale species occur in the offshore waters along the entire Southwest Pacific Zone. Gray whales (355) and humpback whales (361) are found in nearshore waters during their annual migrations between winter breeding areas south of the United States-Mexico border and feeding areas in Alaskan waters. Gray whales migrate north from March to May and south in December and January. A similar north-south movement of right whales (357), sei whales (359), finback whales (360), and male sperm whales (363) occurs farther off

Table 6. Species with special status in the Southwest Pacific Zone.

Map number	Species	Federal		State	
		Endangered	Threatened	Endangered	Rare
	AQUATIC INVERTEBRATES				
91	California freshwater shrimp			X	
	FISH				
180	Unarmored threespine stickleback	X			
	AQUATIC REPTILES AND AMPHIBIANS				
300	Green sea turtle		X		
301	Leatherback sea turtle	X			
302	Pacific Ridley sea turtle		X		
	MARINE MAMMALS				
355	Gray whale	X			
357	Right whale	X			
359	Sei whale	X			
360	Finback whale	X			
361	Humpback whale	X			
362	Blue whale	X			
363	Sperm whale	X			
369	Southern sea otter		X		
	TERRESTRIAL PLANTS				
400	Madder family				X
401	Carrot family			X	
402	Aster family			X	
403	Barberry family			X	

continued

Table 6 (continued).

Map number	Species	Federal		State	
		Endangered	Threatened	Endangered	Rare
	TERRESTRIAL PLANTS (cont'd)				
404	Borage family			X	
405	Mustard family	X		X	
406	Stonecrop family	X		X	
407	Cypress family			X	
408	Figwort family	X		X	
409	Heath family			X	
410	Pea family	X		X	
411	Waterleaf family			X	
412	Mint family	X		X	
413	Lily family			X	
414	False mermaid family			X	
415	Mallow family	X		X	
416	Evening-primrose family	X		X	
417	Grass family			X	
418	Buckwheat family			X	
419	Crowfoot family	X		X	
420	Buckthorn family			X	
421	Rose family			X	
	TERRESTRIAL INVERTEBRATES				
500	Mission blue butterfly	X			
501	Lotis blue butterfly	X			
502	Palos Verdes blue butterfly	X			
503	El Segundo blue butterfly	X			
504	Smith's blue butterfly	X			
505	San Bruno elfin butterfly	X			
506	Lange's metalmark butterfly	X			
509	Valley elderberry longhorn beetle	X			

continued

Table 6 (concluded).

Map number	Species	Federal		State	
		Endangered	Threatened	Endangered	Rare
	BIRDS				
564	California least tern	X		X	
606	California clapper rail	X		X	
607	Light-footed clapper rail	X		X	
608	California black rail				X
659	Aleutian Canada goose	X			
706	California condor	X		X	
708	Bald eagle	X		X	
710	American peregrine falcon	X		X	
761	California brown pelican	X		X	
813	San Clemente loggerhead shrike	X			
814	Least Bell's vireo			X	
815	Belding savannah sparrow			X	
816	San Clemente sage sparrow		X		
	TERRESTRIAL REPTILES AND AMPHIBIANS				
852	Santa Cruz long-toed salamander	X		X	
854	Island night lizard		X		
857	San Francisco garter snake	X		X	
858	Alameda striped racer				X
	TERRESTRIAL MAMMALS				
906	Morro Bay kangaroo rat	X		X	
908	Salt-marsh harvest mouse	X		X	
911	Insular gray fox				X

Table 7. Terrestrial plant species with special status in the Southwest Pacific Zone.*

Map number	Family/Species	Federal		State	
		Endangered	Threatened	Endangered	Rare
400	Madder family				
	Island bedstraw				X
401	Carrot family				
	San Diego coyote thistle			X	
	Mason's lilaeopsis			X	
	Adobe sanicle			X	
402	Aster family				
	Point Reyes blennosperma				X
	Fountain thistle			X	
	Otay tarweed			X	
	Santa Susana tarweed				X
	Santa Cruz tarweed			X	
403	Barberry family				
	Island barberry			X	
404	Borage family				
	San Francisco allocarya			X	
405	Mustard family				
	Contra Costa wallflower	X		X	
	Santa Cruz wallflower				X
406	Stonecrop family				
	Santa Monica Mountains dudleya				X
	Santa Cruz Island dudleya				X
	Laguna Beach dudleya				X
	Santa Barbara Island dudleya	X			

continued

Table 7 (continued).

Map number	Family/Species	Federal Endangered	Federal Threatened	State Endangered	State Rare
407	Cypress family				
	Santa Cruz cypress			X	
408	Figwort family				
	San Clemente Island paintbrush	X			
	Salt marsh bird's beak	X		X	
	Soft bird's beak				X
	Pennell's bird's beak				X
	Monterey Dune monkey flower			X	
	Dudley's lousewort				X
409	Heath family				
	Baker's manzanita				X
	Hearst's manzanita			X	
	San Bruno Mountain manzanita			X	
	Pacific manzanita			X	
	Alameda manzanita			X	
	Hanging gardens manzanita			X	
	Presidio manzanita	X		X	
410	Pea family				
	Trask's milk-vetch				X
	Trask's island lotus	X			
	Santa Barbara false-lupine			X	
	Pacific Grove clover				X
	Monterey clover			X	
411	Waterleaf family				
	Indian Knob Mountain balm			X	
	Lompoc yerba santa				X

continued

Table 7 (continued).

Map number	Family/Species	Federal		State	
		Endangered	Threatened	Endangered	Rare
412	Mint family				
	San Mateo thornmint			X	
	San Diego County monardella			X	
	San Diego mesa mint	X		X	
413	Lily family				
	Dwarf golden star				X
	Tiburon mariposa			X	
	Roderick's fritillary			X	
414	False mermaid family				
	Cunningham Marsh meadow foam			X	
415	Mallow family				
	San Clemente Island bush-mallow	X			
	Santa Cruz Island bush-mallow			X	
416	Evening-primrose family				
	Presidio clarkia			X	
	Pismo clarkia				X
	Antioch Dunes evening-primrose	X		X	
417	Grass family				
	Marin bent-grass				X
	Leafy reed-grass				X
	California orcuttia			X	
	Hoover's semaphore grass				X

continued

Table 7 (concluded).

Map number	Family/Species	Federal		State	
		Endangered	Threatened	Endangered	Rare
418	Buckwheat family				
	Orcutt's chorizanthe			X	
	Butterworth's buckwheat				X
	Conejo buckwheat				X
	Santa Barbara Island buckwheat				X
	San Nicolas Island buckwheat			X	
419	Crowfoot family				
	Baker's larkspur				X
	San Clemente Island larkspur	X			
	Yellow larkspur				X
420	Buckthorn family				
	Hearst's ceanothus			X	
	Maritime ceanothus				X
	Mason's ceanothus				X
421	Rose family				
	Hickman's cinquefoil				X

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*For Latin nomenclature, see Appendix.

shore along the entire U.S. Pacific coast; female sperm whales and their calves remain in tropical waters. The blue whale (362) is a very rare winter migrant off the U.S. Pacific coast; breeding occurs in June and July in tropical waters outside the study area.

The major population of the southern subspecies of the sea otter (369) in the Southwest Pacific Zone occurs along the central California coast between San Luis Obispo and Monterey. Sea otters feed on a wide variety of fish and shellfish, especially crabs, sea urchins, and abalone, and are often seen floating on their backs among kelp blades while eating. Mating can occur throughout the year, but young most commonly are born in the spring.

Seven of the terrestrial invertebrates with special status found in the Southwest Pacific Zone are endangered butterflies. Most populations are restricted to areas with plant species used by larvae for food (larval foodplants); habitat destruction is the primary threat to all seven species.

Mission blue butterfly (500) colonies are found on San Bruno Mountain in San Mateo County (grid reference ES57) and on Twin Peaks in San Francisco County (grid reference ES47). Adults emerge from pupae and fly between late March and mid-April.

The lotis blue butterfly (501) is known to inhabit a sphagnum bog under a Pacific Gas and Electric Company powerline near Mendocino, California (grid reference DU35); two previous sightings in the same area have been mapped, but are unconfirmed. Adults emerge from pupae and fly between April and May. Very little is known about the life history of this butterfly or its population trends; it is common in its restricted habitat.

The Palos Verdes blue butterfly (502) is found only in small areas of the Palos Verdes Peninsula (grid reference LH73). Adults are extremely sedentary and stay near the larval foodplant. They emerge from pupae and fly from late February to early March.

Colonies of the El Segundo blue butterfly (503) are found in two areas: Los Angeles International Airport (grid reference LH65) and at the Chevron refinery in El Segundo (grid reference LH65 and LH75). Adults emerge from pupae and fly from mid-July to late August remaining near the larval foodplants; other plant species are used for roosting in the evening.

Smith's blue butterfly (504) colonies occur within the coastal fog belt of Monterey County. Adults emerge from pupae and fly between mid-June and early August. Most remain near the larval floodplant and nectar source, although some will fly long distances.

The San Bruno elfin butterfly (505) is found in San Mateo County. Adults emerge from pupae and fly during March and are very sedentary, remaining near the larval foodplant and perching sites.

Lange's metalmark butterfly (506) colonies occur in the Antioch sand dunes in Contra Costa County (grid reference FT00). Adults emerge from pupae and fly from early August to late September. Males tend to aggregate and remain in a single clump of the larval foodplant, while females frequently move between clumps and fly farther than males.

The extremely rare valley elderberry longhorn beetle (509) is endemic to Sacramento, California, and adjoining areas. The life cycle apparently requires two years. Eggs are deposited in the bark of living elderberry plants, and larvae bore in the pith of the stem and roots. Prior to pupation, larvae open an emergence hole through the bark, then return to the pith to pupate. Adults emerge at about the same time or a few weeks before the host plant blooms. Destruction of elderberry groves due to urban development is the primary threat to this species.

The California least tern (564) is a summer visitor (mid-April to mid-October) along the California coast and breeds from Mexico to San Francisco Bay. Nesting colonies occur in sparsely vegetated, flat areas with loose substrate near estuaries with supplies of small fish.

The California clapper rail (606) is a resident species in relatively unpolluted salt marshes in the San Francisco Bay area and at Elkhorn Slough (grid reference FR07 to FR18). Recent reports of this species at Morro Bay and in Humboldt County (not mapped) indicate that, although it no longer breeds there, it may occasionally be found as a vagrant in these areas. Nesting is from mid-March to July; the platform nests are built on or near the ground, and are usually associated with a tidal slough and fairly dense growths of pickleweed.

The light-footed clapper rail (607) is a resident of salt marshes from Mexico to Santa Barbara County. Nesting occurs from mid-March to July. The nest, which is composed of loosely arranged plant stems, is built on or near the ground and is concealed in dense or tall vegetation on high ground. Nests are buoyant and will float with the tide.

The California black rail (608), though few in number, is most abundant in salt or brackish marshes in the northern San Francisco Bay area, but has been reported infrequently as far south as San Diego County. Nesting begins in mid-March. The nest is a cup of grasses built on the ground in a tuft of grasses or a clump of pickleweed and concealed by overhanging plant stems.

The Aleutian Canada goose (659) breeds in Alaska on Buldir Island of the Aleutian Islands. The birds leave the breeding grounds in late August and may be seen in the northern half of the Southwest Pacific Zone, migrating to their wintering grounds in the Sacramento and San Joaquin Valleys, arriving in California in October. The birds leave California in late April from a staging area in northwest California (see part 5). Population decline is primarily due to the introduction of Arctic foxes on the Aleutian Islands, although hunting is a contributing factor.

The California condor (706) is an extremely sensitive species with a population of 40 or fewer individuals. In the coastal zone, it ranges between Los Angeles and the San Francisco Peninsula. Nesting occurs in the Coast Range Mountains, outside the coastal zone, starting in mid-February. This species requires large, undisturbed areas for breeding and feeding; destruction of habitat and disturbance of nesting birds has led to a drastic reduction of the population.

Bald eagles (708) currently do not nest within the Southwest Pacific Zone, but may be seen wintering within the northern parts of the zone between October and April, where they frequent salmon and steelhead spawning areas.

The American peregrine falcon (710) is an extremely sensitive species. To prevent illegal collection of nestlings by falconers and disturbance by bird-watchers or photographers, locations of nest sites were not revealed in this inventory (with the exception of the well-publicized Morro Rock nest site at grid reference FQ91); inquiries as to locations may be directed to FWS or California Fish and Game. Nests are normally found on cliff ledges, but may be seen in trees. Nesting usually begins in early March. Although illegal collection, shooting, and disturbance have contributed to the decline of this species, the major decrease appears to have been due to food chain contamination by persistent insecticides.

The California brown pelican (761) is found throughout the Southwest Pacific Zone between August and November, but only breeds on Anacapa Island and Santa Barbara Island. Nesting may begin as early as February, but is more usual in March or April. Colonies usually nest on steep, rocky slopes, but occasionally nest in trees or shrubs. Nests are composed of sticks, grasses, feathers, and debris. Eggshell thinning due to accumulation of persistent insecticides has caused the greatest population reduction; human disturbance and food stress resulting in nest abandonment are also problems.

The San Clemente loggerhead shrike (813) is found only on San Clemente Island. Nesting begins during February or March and double-clutching may occur. Nests are built in dense bushes or small, dense trees at a height of 1 to 7 meters (3 to 23 feet) off the ground. This very aggressive species requires room for roosting, breeding, and in fall and winter feeding areas. Destruction of wintering and breeding habitat by introduced livestock has reduced the reproductive potential of this species.

The least Bell's vireo (814) is found in the coastal zone between San Diego County and Santa Barbara County. The birds arrive in late March and nesting begins in mid-April. Nests are usually built in dense understory vegetation. The population decline is primarily a result of nest parasitism by brown-headed cowbirds.

The Belding savannah sparrow (815) is sedentary and is adapted to coastal pickleweed marshes from Mexico to Santa Barbara County. Territories are established in late December and nesting begins in March. Nests composed of pickleweed twigs are found on the ground or in low branches of dense pickleweed.

The San Clemente sage sparrow (816) is found only on San Clemente Island. Nesting usually begins in late March. Nests are built near the ground in scrubby brush. It is presumed that these birds require dense, continuous brush like their mainland counterparts; habitat destruction by introduced goats and wild boars poses the greatest threat to this species.

The Santa Cruz long-toed salamander (852) is found in the Monterey Bay area and possibly in Año Nuevo State Reserve. Breeding occurs between November and February. Large migrations to breeding ponds take place during heavy rainstorms. Adults remain at the ponds only a short time before returning to underground retreats. Agriculture, highway construction, and residential development have disrupted both breeding and non-breeding habitat.

The island night lizard (854) is found on Santa Barbara, Sutil, San Clemente, and San Nicolas Islands. Although there are no recent confirmed sitings, it may also be found on Santa Catalina Island. Breeding occurs between May and June and young are born in September. This species is mostly active at night and shelters under rocks, fallen branches, and driftwood during the day. Predation on this species and competition for food by introduced animals, including the accidental introduction of the alligator lizard on San Nicolas Island, are the greatest threats to this species.

The San Francisco garter snake (857) is found on the San Francisco Peninsula in areas with ponds and lakes bordered by vegetation or marshes with good cover. The Alameda striped racer (858) is found in Alameda and Contra Costa Counties in chaparral, grasslands, open woods, and on rocky slopes. Both species are threatened by residential development leading to habitat destruction and illegal removal by collectors.

The Morro Bay kangaroo rat (906) is found in only two locations at Morro Bay. Burrow systems, including a nest chamber, are dug in sandy soil covered by low, sparse vegetation. Breeding may occur throughout the year, but most young are born between February and August. Residential development, predation by domestic cats, and increased vegetation densities are the major threats to this species.

The salt-marsh harvest mouse (908) is restricted to salt and brackish marshes in the San Francisco Bay area, where dense vegetation, usually including pickleweed, in combination with open ground is available. Reproduction may continue throughout the year, but most births occur between March and November. Nests are built of dry grasses or sedges on the ground or in hummocks of vegetation. Destruction of the salt marsh habitat threatens this species.

The insular gray fox (911) is found on San Miguel, Santa Rosa, Santa Cruz, Santa Catalina, San Nicolas, and San Clemente Islands. The young are born in April or May in dens dug under large rocks or in cliff crevices. The foxes are omnivorous. Competition with introduced species and habitat destruction threaten this species.

4.2.2 Aquatic Resources

Brief descriptions of the life histories of some of the major commercially, recreationally, and ecologically important aquatic organisms which occur within the Southwest Pacific Zone are provided below.

Plants

Kelps, seaweeds, and seagrasses are important sources of food for many benthic species in the inshore areas along the entire U.S. Pacific coast.

Kelps generally prefer rocky habitats at depths ranging from mid-to-low intertidal areas for feather boa kelp to as deep as 50 meters (164 feet) for some laminarian kelps. Giant and bull kelps prefer open shorelines at depths of 6 to 20 meters (20 to 66 feet) and 10 to 17 meters (33 to 56 feet), respectively; bull kelp generally is less abundant south of Monterey, California. Both reproduce mainly in mid-to-late summer; growth rate for all kelps generally is highest in spring. Both giant and bull kelps are commercially important for the extraction of chemicals, particularly algin and minerals from giant kelp.

Laver, or red seaweed, comprises several species and is distributed in many habitats from Baja California to Alaska. An annual, it often forms dense mats on recently scoured rock habitats, especially in the intertidal zone. It most commonly is encountered in winter and early spring. Laver commonly is harvested or cultured for food.

Beds of perennial seagrasses are found year-round at intertidal and shallow subtidal depth on both rocky and soft substrates of the U.S. Pacific coast. Surfgrasses are found in exposed and semiprotected rocky habitats in small beds. Eelgrass forms extensive beds in shallow water on sheltered sand and mud flats. These flowering grasses, especially eelgrass, are important forage plants for herbivorous waterfowl and contribute substantial quantities of plant matter to nearby benthic assemblages. The beds often form nursery areas for juveniles of many important invertebrates and fish.

Invertebrates

Dungeness crabs live on and in fine and coarse substrates in protected and exposed areas from southern California to the Aleutian Islands. Although occurring in intertidal areas, they are most common, especially as adults, in subtidal habitats out to depths of at least 90 meters (295 feet). Generally, breeding occurs in the spring and females brood the eggs in fall and winter. Larvae remain planktonic for about 100 days. Metamorphosis and juvenile recruitment occur between April and June. Bays and estuaries provide important nursery areas for the juvenile stage, which lasts for the first two to three years. Dungeness crabs are the most important commercial and sport fishing crab from California to Washington in both inshore and offshore waters; major commercial fisheries exist year-round, but particularly in the winter, off of northern California in the Southwest Pacific Zone.

Blue mussels are found predominantly in protected areas on pilings, floats, gravel, rocks, or mud flats from Baja California to the Arctic. Although most frequently encountered intertidally, blue mussels are found subtidally where low predation pressure permits. This mussel tolerates widely varying conditions in temperature, salinity, desiccation, turbidity, and wave shock. Spawning occurs year-round, but peaks in winter. Recruitment to mussel beds peaks from May to September, but substantial sets of spat also occur in the winter. Blue mussels are a much underutilized subsistence food species; harvesting generally occurs in winter.

The California mussel most commonly is encountered on intertidal rock substrates from Baja California to southeastern Alaska where wave exposure is great and water is basically oceanic. Its lower depth limit varies and is restricted mainly by sea star predation. Local distribution is restricted by conditions of low salinity. Spawning peaks from October to March, but occurs year-round; recruitment occurs year-round, with summer and winter peaks. California mussels are a large potential food resource, but their tendency to concentrate toxins limits their utilization.

Pacific oysters, an introduced species living on hard substrates in mid-intertidal and shallow subtidal estuarine habitats, occur from around San Francisco Bay to British Columbia. Spawning occurs in summer when temperatures reach approximately 20°C (68°F). The Pacific oyster was originally introduced for commercial aquaculture and remains the preferred oyster along the U.S. Pacific coast because it grows more rapidly and larger than the indigenous species. Oysters are harvested mainly in the spring.

Adult rock scallops live firmly attached to clean rocks from the lower intertidal zone to a depth of about 45 meters (148 feet) from Baja California to British Columbia. Spawning probably occurs from late spring to midsummer and recruitment occurs within a short period. This species is important primarily as a sport fishery to divers; rock scallops generally are taken year-round.

Common littleneck clams live buried just below the surface of intertidal and shallow subtidal substrates, especially mixed silty sand and gravel, along much of the U.S. Pacific coast. They are most common in partially protected bays or subtidal areas with moderate currents. Spawning often occurs in February or March; larvae spend several weeks as plankton. Littlenecks are of commercial and recreational importance in northern California, and generally are taken in winter.

Gaper clams live in burrows up to 90 centimeters (36 inches) deep, in firm sand or mud substrates of bays and estuaries from Baja California to south-central Alaska, from the intertidal zone to at least 30-meter (98-foot) depths. Spawning occurs in summer or winter, depending on the species; larvae remain planktonic for at least one month. Gaper clams are a major sport clam species in California and are also taken in a small commercial fishery, usually in winter.

The soft-shelled clam lives buried to depths of up to 45 centimeters (18 inches) in silty sand or mud habitats in bays from San Francisco, California, to Alaska. It lives primarily in intertidal flats where turbidity is high and salinity is often low. Spawning, planktonic larval development, and recruitment occur mainly in mid-to-late summer. Soft-shelled clams are an important sport species and have considerable commercial potential; they are harvested mainly in winter.

The geoduck clam lives buried to depths of 90 centimeters (36 inches) in intertidal and subtidal sediments, ranging from soft mud to mixed sand and gravel, from the Gulf of California to southeastern Alaska. Although populations found on intertidal mud flats indicate a tolerance for conditions of variable salinity, tubidity, and temperature, the larger populations are found at depths greater than 10 meters (33 feet) in areas with good flushing, moderate currents, and good water quality. Spawning and planktonic larval development occur in spring and early summer and recruitment probably is highest in midsummer. Geoducks are an important sport resource on intertidal flats and have been an important commercial species subtidally; geoducks are harvested mostly in winter.

Razor clams live buried to depths of 30 to 45 centimeters (12 to 18 inches) in clean intertidal and shallow subtidal sand of exposed beaches from central California to the Aleutian Islands. Although generally found in areas bathed by oceanic waters, razor clams also do well in areas exposed to high turbidity, moderate salinity, and low temperatures. Spawning mainly occurs in late May or early June and is followed by a two-month period of planktonic larval development. Razor clams used to be an important commercial species, but present stocks are too low to support a significant commercial harvest. The sport season for razor clams generally occurs in winter.

The Pismo clam is found mainly in clean sand of exposed beaches and nearshore areas out to depths of 25 meters (82 feet) from Baja California to central California. It is most common at lower tide levels. Although it tolerates a moderate range of temperatures, it only occurs in areas with water of generally oceanic characteristics. Spawning generally peaks in mid-to-late summer. Larvae remain planktonic for several weeks, then settle into the beach sand and metamorphose into juvenile clams. Pismo clams are an important sport clam throughout their range, but particularly at Pismo Beach, California.

Five species of abalone are mapped in the Southwest Pacific Zone. Abalone occurring only south of Point Conception, California, are the pink, white, and green abalones. The red abalone occurs as far north as Sunset Bay, Oregon, and the black abalone occurs as far north as Coos Bay, Oregon. Blacks are found generally in the intertidal zone; depths for greens are between 3 and 6 meters (10 and 20 feet), for reds are between 6 and 15 meters (20 and 49 feet), for pinks are between 6 and 24 meters (20 and 79 feet), and for whites are between 24 and 30 meters (79 and 98 feet). All require oceanic salinities. Black, green, and red abalones appear mainly in areas with strong wave action whereas the white abalone lives in deeper quieter areas. All live on rock, often in crevices or under ledges. Spawning occurs mainly in late spring and summer for all species; the larvae are planktonic for one to two weeks and then settle to the bottom. Abalone are an important resource for both commercial and sport fisheries in California, especially south of Monterey, where the abalone are larger and species diversity is higher.

Bay shrimp most commonly are encountered on protected or partially protected sand or sandy mud substrates in shallow water, especially in bays and sounds, from Baja California to Alaska. Although common on quiet intertidal beaches, they are very abundant subtidally and tolerate estuarine conditions. Females with eggs are common during most of the year; larvae are planktonic for several months. Bay shrimp form the basis of a small commercial shrimp fishery for food and bait in San Francisco Bay.

Ghost shrimp live in protected or partially protected areas with soft substrate from Baja California to southcentral Alaska. Although mainly reported from intertidal habitats, they also occur in at least upper subtidal areas. Ghost shrimp frequently occur in estuarine areas. Ghost shrimp burrow at least 50 centimeters (20 inches) into sediment, affording considerable protection from environmental variations. Their burrowing activity probably acts to turn over the sediments twice each year. In areas of oyster culture, their burrowing activity tends to smother oyster spat and so burrowing shrimp are considered pests. Wherever they occur in substantial density, their burrows increase the area of the sediment-water interface considerably and offer a pathway through which contaminants can penetrate deeply into the sediment in large quantities. Spawning occurs in June and July, and the planktonic larval stages last only several weeks. A small commercial fishery for burrowing shrimp exists to provide live bait for steelhead and salmon.

Spiny lobsters are most commonly encountered under ledges and in rock piles, in subtidal areas out to about 80 meters (262 feet), from Baja California to Point Conception, California. They also occur in seagrass beds and tide pools, and move across soft substrates. Females with eggs are observed between May and August; larvae remain planktonic for about six months. Spiny lobsters are the focus of important commercial and sport fisheries in southern California.

The common inshore squid is found in both nearshore and offshore waters, especially over soft sloping substrates, from central Baja California to British Columbia. The spawning season varies with latitude, ranging in the Southwest Pacific Zone from January and February in southern California to April through July in Monterey Bay, California. Large masses of gelatinuous egg capsules are attached to the sloping sand or mud bottom in protected bays at depths between 3 and 40 meters (10 to 131 feet). Larval development requires three to four weeks; juveniles can swim and feed immediately. Squid are the basis of a small commercial fishery in Monterey Bay and southern California; harvested squid are used for food and bait.

Three species of sea urchin occur on most intertidal and subtidal rock substrates in exposed and protected areas from Baja California to the Aleutian Islands. All require high salinity and, therefore, do not occur in strictly estuarine habitats. All tolerate moderate variations in temperature, but major geographic distribution patterns probably are somewhat determined by temperature tolerance. Dissolved oxygen requirements and ability to maintain a grip on the rocks are probably other factors important in local distribution patterns. Spawning occurs mainly in late winter and spring; larvae remain planktonic for up to three months. Large sea urchin populations can cause defoliation of kelp beds. Sea urchins are harvested commercially in California for the gonad, which is sold on the oriental food market.

Purple coral occurs uncommonly from southern California to Alaska in exposed rocky intertidal and subtidal habitats as encrusting or branched colonies. Generally, these colonies require clean, cold oceanic water. Encrusting forms occur in areas exposed to surf, whereas branching forms occur in less turbulent areas exposed to coastal currents. In California, some areas supporting large concentrations of branching coral have been designated as marine sanctuaries to protect the limited habitat from exploitation by sport and commercial divers. The reasons for their protected status are primarily aesthetic; they also have been used in the manufacture of jewelry.

Fish

Commercially important fish in the Southwest Pacific Zone include the following: chinook salmon, coho salmon, starry flounder, English sole, lingcod, yellowfin tuna, skipjack tuna, albacore, white sturgeon, Pacific herring, northern anchovy, eulachon, swordfish, Pacific barracuda, and dolphin. Important sport fish include some of the above species plus the following: steelhead trout, pile perch, California grunion, striped bass, giant sea bass, jack mackerel, yellowtail, American shad, and cabezon.

a. Freshwater species. The threespine stickleback commonly is found in freshwater streams and brackish water areas along the U.S. Pacific coast. Large schools of sticklebacks are common, except during the spring breeding season when males are territorial. Males construct an elaborate nest and guard the eggs and hatched young until they are ready to leave the nest. Sticklebacks are a popular fish for scientific research.

Sunfish, including bass, bluegill, and white and black crappie, are widely distributed in the warmer lakes, reservoirs, and streams throughout the U.S. Pacific coast. These species are very popular year-round as sport fish. Catfish, though less common than sunfish, can be found in many of the same freshwater areas and also are popular sport species. Sunfish and catfish are nesting species that spawn in spring or early summer, depositing their eggs into scooped-out depressions in bottom sediments.

b. Anadromous species. Anadromous fish spend most of their lives in an ocean environment, but spawn in freshwater rivers.

The chinook salmon, the largest Pacific salmon species, is distributed from southern California to Alaska. Chinook salmon prefer large rivers with stable water conditions. Many rivers have two distinct races of chinook salmon: the spring run and the fall run. Spring run chinook enter rivers from February to June and spawn from August to October; fall run chinook enter rivers from July to December and spawn from August to December. Eggs are laid in streambeds in depressions scooped out of the gravel. Adults die after spawning. Eggs hatch in late winter to early spring and the young migrate to sea soon after hatching, although young from the spring run may remain in freshwater up to one year. Juveniles in estuaries and returning adults are bottom oriented, but chinook are pelagic during their marine stage. Young fish seem to prefer bay and cove areas along fairly straight open coastline. Chinook salmon are important as both a commercial and sport species. The commercial fishing season extends from May through October excluding the month of June; the sport fishing season varies.

The coho salmon is distributed from Baja California to Alaska. Coho salmon spawn in large rivers, their headwaters, and tributary streams. Adults enter rivers from September to October and die after spawning. Coho fry usually remain in freshwater for one year after hatching, then move in schools to saltwater. Coho salmon usually remain in saltwater for about a year and a half during which they migrate extensively, primarily in nearshore waters. Coho salmon are bottom oriented as freshwater juveniles and returning adults, and pelagic during their marine stage. Juveniles prefer deeper, nearshore waters such as estuaries, coves, and bays with coarse sand and gravel sediments. Coho salmon are important commercial and sport species. The commercial fishing season extends from mid-May through October excluding the month of June; the sport fishing season varies.

The steelhead, an anadromous rainbow trout, is distributed from southern California to Alaska. Most spawning runs take place from November to April; however, some races enter rivers in summer. Adults may spawn over two to three seasons before dying. After hatching, juveniles spend two to three years in the freshwater environment. They enter the marine environment at any time of the year and spend 30 to 60 days in nearshore areas before moving into oceanic waters. The marine portion of the life cycle is spent well offshore. Steelhead are bottom associated as juveniles and returning adults, and pelagic during their marine stage. Steelhead are an important sport species, but are not taken commercially.

Striped bass are distributed from southern California to southern British Columbia, but are most common between Monterey Bay, California, and Coos Bay, Oregon. They were introduced on the U.S. Pacific coast in 1879 in San Francisco Bay. Striped bass are anadromous; spawning occurs in spring in fresh or slightly saline water in sloughs and impoundments. The eggs sink, hatching occurs in about 48 hours, and the young assume a pelagic existence. Striped bass are no longer commercially important, but are highly sought as a sport species.

The Pacific lamprey is distributed from Baja California to Alaska. Pacific lamprey are anadromous; mature individuals enter freshwater streams from July to October and spawn the following spring. Eggs are laid in nests and hatch in three to four weeks. Young spend several years in their parent stream. Once transformation to the adult form is complete, they migrate downstream. Lamprey are noted most for the damage and scarring they do to commercial and sport fish species.

The green sturgeon is distributed from southern California to Alaska. Green sturgeon prefer salt or brackish water and only travel short distances up rivers for spawning in the spring. Green sturgeon constitute a minor sport and commercial species.

The white sturgeon is distributed from northern California to the Gulf of Alaska. They are an anadromous species, ascending freshwater streams for spawning, and actually spending most of their lives in freshwater. Males reach maturity in 11 to 22 years, while females reach maturity in 11 to 34 years. Spawning occurs in the spring or summer, but details of juvenile biology are not known. White sturgeon are an important sport and commercial species, both for their flesh and their eggs, which are used in the production of caviar.

American shad is an introduced species on the U.S. Pacific coast. It ranges from Baja California to the Aleutian Islands, but its center of abundance lies between San Francisco Bay and the Columbia River. Shad are anadromous, spawning in the lower reaches of large rivers during spring. Eggs sink upon fertilization and hatching occurs in three to six days; after hatching the young drift downstream to estuarine nurseries before they enter the ocean. Juveniles may be present in estuaries year-round. It is thought that substantial north-south migrations occur at sea. Shad are highly desirable sport fish and also are taken commercially.

The eulachon is distributed from northern California to Alaska. Eulachon occur in inshore ocean waters and ascend large, coastal rivers short distances to spawn during late winter and early spring; most adults die after spawning. Hatching occurs within 30 days; after hatching the larvae drift downstream and undergo maturation in coastal and nearshore waters. Eulachon are an important sport and commercial species.

c. Estuarine-dependent species. All salmonids, numerous flatfish, and sturgeon are estuarine dependent, requiring low salinities, at some point in their life history. Estuaries are important as breeding, nursery, or feeding areas.

Starry flounder range along the U.S. Pacific coast from southern California to Alaska. They are primarily found in shallow, nearshore waters but have been reported from depths as great as 275 meters (900 feet). Spawning occurs from December to April (earlier in the southern and later in the northern portions of their range); the eggs are free-floating, and larval starry flounder swim with the tides and currents. After metamorphosis, juveniles use bays and estuaries as nursery areas. Starry flounder have a wide tolerance of bottom conditions avoiding only rocky bottoms. Starry flounder are an important commercial and game fish in winter and early spring along the entire U.S. Pacific coast.

The English sole is distributed from Baja California to Alaska to depths as great as 550 meters (1,800 feet). Spawning occurs offshore in deep water from December to March; young settle on sandy beaches in spring. Metamorphosis and early juvenile stages take place in bays and estuaries. In early stages young English sole occupy intertidal areas, gradually moving to deeper water as they age. Silty to sandy bottoms seem to be the preferred habitat type; eelgrass areas are important to juveniles. English sole are an important sport and commercial species in winter and early spring along the entire U.S. Pacific coast.

Topsmelt are distributed from the Gulf of California to southern British Columbia. Topsmelt are schooling fish and are common in bays, estuaries, and near kelp beds. Spawning schools form in early spring and enter bays or estuaries. Eggs are deposited on aquatic vegetation, such as eelgrass, from spring to early summer. Topsmelt are commonly caught by pier fishermen in California.

Pacific herring are distributed from northern Baja California to Alaska along the U.S. Pacific coast. Spawning occurs in mass groupings in late winter to early spring in shallow subtidal and intertidal areas. Egg masses attach to structures such as eelgrass, pilings, oyster shells, and algae; metamorphosis occurs after two months. Pacific herring follow an inshore-offshore migration pattern. They are an extremely important species, both for their commercial value and as forage fish for many other species.

The longjaw mudsucker is primarily distributed along the southern California coastline in shallow bays and mudflats. It is known to enter river mouths but is primarily a marine or brackish water species. Longjaw mudsuckers are of minor commercial importance, the bulk of them being used in pet food.

d. Oceanic species. Oceanic species occur in shallow or nearshore waters (within the three-mile limit) either periodically as part of their life history or occasionally in the quest for food.

The California halibut is distributed from Baja California to the southern Washington coast in waters generally shallower than 46 meters (150 feet). Spawning occurs February to July, in 5 to 18 meters (18 to 60 feet) of water. California halibut show minor inshore and offshore movement; they usually are found inshore in summer. The California halibut is a highly desirable commercial and sport species and is widely sought over its entire range.

The speckled sanddab is distributed from Baja California to southeast Alaska in shallow water, especially near sandy beaches. Spawning occurs in late winter-early spring. This species is important as a forage fish for other species.

The lingcod is distributed from Baja California to Alaska at depths from the surface to 421 meters (1,380 feet). It is most common in waters 91 meters (300 feet) or less. Spawning fish move inshore, even into intertidal regions, from December to March and lay large adhesive egg masses in rock crevices. Males guard the eggs for about six weeks until hatching. Lingcod frequent boulder, rubble, or reef areas where strong currents are present. Shallow reefs in low intertidal areas are critical during spawning for egg attachment. Lingcod are a highly valuable commercial and sport species.

The Pacific tomcod is distributed from central California to the Bering Sea at depths up to 219 meters (720 feet). Spawning is believed to occur in the winter months, generally in shallow water up to 91 meters (300 feet) deep. Pacific tomcod are pelagic as adults but are thought to be bottom oriented as juveniles and during spawning. They are a minor sport and commercial species in the Southwest Pacific Zone.

Shiner perch are distributed from northern Baja California to southeast Alaska, generally in shallow water. Sperm is held by females for five to six months prior to fertilization. Young are born live and move inshore, gradually moving into deeper water with age. Shiner perch are a very abundant, schooling species; their small size limits their sport importance, but they are fished to a limited degree.

The pile perch is distributed from northern Baja California to Alaska in shallow waters, especially along rocky shores and around piers. Breeding occurs in the summer and young are born live. Pile perch are a schooling fish; they remain near piers and rocky reefs most of their lives. They are highly regarded as a sport fish.

The California grunion is distributed from Baja California to Point Conception, California, in inshore waters 5 to 12 meters (15 to 40 feet) deep. Grunion spawn on beaches at night from late February or early March to August or early September. Spawning is correlated with spring (new or full moon phase) high tides. Eggs normally hatch in about 15 days at the next spring high tide cycle. Grunion may spawn up to six times during one season. Grunion are not important commercially, but are very popular as sport species, attracting hundreds of people to beaches where grunion are known to spawn.

Sea basses includes two different species commonly known as kelp bass and barred sand bass. Kelp bass are distributed from Baja California to Oregon, but are most common along the southern California coastline in waters to 46 meters (150 feet) depth. Spawning occurs from spring through fall in kelp beds and rocky bottom areas. Barred sand bass occur in waters as deep as 183 meters (600 feet) from Baja California to central California and show migratory movements of up to 64 kilometers (40 miles) within this range. Barred sand bass concentrate in schools for spawning, which occurs from spring through fall. Both kelp and barred sand bass are taken by sport fishermen; commercial fishing for these species in United States waters has been banned since 1953.

Giant sea bass are distributed from the Gulf of California to Humboldt Bay in northern California, but are most common south of Point Conception. Preferred habitat includes rocky bottoms off kelp beds and drop-off areas in 35 to 46 meters (115 to 150 feet) of water. Spawning occurs from June to September. Adults congregate at this time in shallow water areas to mate and deposit eggs. Little is known concerning larval or juvenile ecology. Giant sea bass are a popular sport fish, but are not taken commercially.

Chub mackerel are distributed from the Gulf of California to the Gulf of Alaska, but are most abundant south of Monterey Bay. Chub mackerel are schooling fish occurring up to 400 kilometers (250 miles) offshore. They migrate long distances north and south, moving inshore in search of food. Spawning occurs in the summer and both eggs and larvae are pelagic. Chub mackerel are caught by both commercial and sport fishermen along the California coastline.

Jack mackerel are distributed from Mexico to the Gulf of Alaska and range up to 2,400 kilometers (1,500 miles) offshore. Spawning occurs year-round with a peak in the spring. Both eggs and larvae are pelagic; evidence indicates that juveniles move nearshore and then gradually offshore with increasing age. Jack mackerel are caught by sport fishermen, but are of minor commercial importance.

Yellowfin and skipjack tunas are distributed from Chili to central California, but are most common in tropical Pacific waters. They are pelagic, schooling species that range up to 483 kilometers (300 miles) from shore. Spawning may occur during most of the year beyond the three-mile limit; larvae are pelagic and show rapid growth. Yellowfin and skipjack tunas are highly prized sport fish that are abundant near the U.S. Pacific coast only during years when summer currents bring warmer sea surface temperatures inshore. The commercial tuna fishery for these species is very important and consists of a high seas fleet of tuna seining vessels.

Pacific bonito are distributed from Mexico to Alaska, but are most abundant from Baja California to Point Conception, California, moving inshore in search of food. Pacific bonito are an epipelagic schooling species, spawning offshore during late winter to early spring. Pacific bonito are not a major commercial species though large quantities may be taken. They are a highly desirable sport fish.

The albacore is distributed from the Gulf of California to the Gulf of Alaska. It is a pelagic schooling species that engages in extensive migrations through its range, and may follow food sources inshore. Spawning occurs from January to June in tropical waters. Albacore is commercially fished along the entire U.S. Pacific coast, generally in summer and fall. It is also highly sought by sport fishermen that operate from party vessels well offshore.

The yellowtail is distributed from Mexico to southern Washington, with the center of the population off of Baja California. Yellowtail is epipelagic, occurring from the surface to 24 meters (80 feet) deep in the water column; it moves inshore following schools of mackerel and other food sources. Spawning occurs well offshore from July through October. Yellowtail is a major sport species off the southern California coast. The commercial catch of yellowtail is small and use is limited to fresh food fish.

The cabezon, one of the largest sculpins, is distributed from Baja California to southeast Alaska at moderate depths and is often abundant in shallow waters. Spawning can occur from late winter to early spring, depending on location, near rocky reefs with attached vegetation from low intertidal to subtidal areas. Preferred adult habitat includes rocky or sandy bottoms at or below the lower intertidal zone to 55 meters (180 feet). Cabezon enter into the commercial harvest accidentally, but are sought by sport fishermen, especially SCUBA divers.

Spiny dogfish are distributed from northern Baja California to Alaska, but are most common from northern California to northern British Columbia. They are found nearshore year-round from the surface to 730 meters (2,400 feet) deep in the water column. Spawning occurs in offshore areas and females give birth to live young after a 16- to 26-month gestation period. Dogfish school in groups segregated by age and sex. General migration patterns are to the north in summer and to the south in winter. An extensive commercial fishery for dogfish existed prior to 1950, when dogfish livers were collected for their vitamin A content. They are now only a minor commercial and sport species.

The ocean whitefish is distributed from below the United States-Mexico border to Willapa Bay, Washington, but is not common north of Point Conception, California. Spawning and life history information is generally not known. Ocean whitefish are an excellent food fish, but compose only a small part of the commercial and sport catch.

The northern anchovy is distributed from Baja California to the United States-Canada border, with its center of abundance south of San Francisco Bay. Spawning may occur throughout the year, but peaks in winter and spring; eggs and larvae are pelagic. Northern anchovy is pelagic throughout its life cycle and schools in nearshore coastal waters. Northern anchovies are an important commercial species in California for use in the live bait industry.

The Pacific sierra is a warmwater mackerel species distributed from Baja California south. It rarely migrates north to the California coast and probably does so only during summer periods with warm ocean surface currents. Life history information is poorly known, but it is assumed that Pacific sierras spawn offshore in warm waters as do other mackerels. Due to their limited presence off the California coast, Pacific sierra are of minor commercial and sport importance.

Swordfish are most abundant off southern California, but range as far north as Oregon. Spawning occurs only in water temperatures of at least 24°C (75°F). Swordfish are seasonal migrants off the coast of California between May and November. They frequent islands and banks, submarine canyons, and steep submarine ridges. Swordfish are an important species to both sport and commercial fishermen.

The Pacific barracuda is distributed from Baja California to the Gulf of Alaska, but is not common north of Point Conception, California. It is a nearshore, schooling fish. Spawning peaks in late spring to early summer and both eggs and larvae are pelagic. Barracuda is a popular commercial and sport species along the southern California coastline.

The California sheephead is distributed from the Gulf of California to Monterey Bay, California, but is uncommon north of Point Conception. Spawning occurs during the summer months in offshore kelp beds and rocky areas. Sheephead are common inhabitants of offshore kelp beds and are a popular sport species for fishermen and SCUBA divers.

The dolphin is distributed from below the United States-Mexico border to southern Washington, but is most common in the Southwest Pacific Zone off southern California. The dolphin is epipelagic and follows warm, summer ocean currents nearshore. The dolphin is an important commercial and sport fish species.

The garibaldi is distributed from the United States-Mexico border to Point Conception, California. Garibaldis frequent rocky bottom areas, such as reefs and kelp beds, in waters less than 29 meters (95 feet) deep, and are highly territorial; spawning occurs in these areas continuously through spring and summer. The garibaldi is California's State fish and it is illegal to take garibaldis in the State.

The Pacific sardine is distributed from the Gulf of California to southeast Alaska. It is a pelagic, schooling species that occurs up to 563 kilometers (350 miles) offshore. Spawning usually occurs offshore, but within 160 kilometers (100 miles) of the coast. An extensive commercial fishery existed during the first half of the twentieth century, but populations have declined due to overfishing; in areas of local abundance, it is popular for use in the live bait industry.

The striped mullet is distributed worldwide in warm waters; however, it is an infrequent, summer visitor off the southern California coast. Mullets are shallow-water, schooling fish usually associated with sandy or muddy bottoms with heavy loads of detritus. The striped mullet is of limited commercial importance in southern California.

Reptiles and Amphibians

The only aquatic reptiles and amphibians occurring within the Southwest Pacific Zone are classified by the Federal Government as endangered and are discussed under Species with Special Status (part 4.2.1).

Mammals

A wide variety of marine mammals is found within the Southwest Pacific Zone. Many are year-round residents while others migrate through the coastal waters. All mapped marine mammals are protected by the Marine Mammal Protection Act of 1972.

The northern fur seal ranges from the United States-Mexico border to Alaska. Along the U.S. Pacific coast fur seals are usually seen in small groups from 16 to 80 kilometers (10 to 50 miles) offshore. Males arrive on the Pribilof Islands (Alaska) breeding grounds in late April and May and await the arrival of females in June and July. A single pup is born to a female immediately after females arrive in the islands. An annual harvest of fur seals is closely regulated by international treaty.

The California sea lion ranges from Mexico to Vancouver Island, British Columbia. It is a fairly common inhabitant of rocky, exposed shores and offshore islands along the U.S. Pacific coast. It breeds from central California south, primarily on Año Nuevo island, from May to June.

The Steller sea lion ranges from the California Channel Islands to Alaska. Steller sea lions most frequently occupy remote rocky headlands and offshore islands along the U.S. Pacific coast. They breed on islands, remote headlands, and reefs throughout their range, females giving birth to a single pup during June and July.

The harbor seal's range extends the entire length of the U.S. Pacific coast. Northern and southern subspecies exist and there is probably some range overlap in central California. Harbor seals frequent bays, estuaries, tidal rivers, and even open coastline. They mate in the water during September and give birth about 9 to 10 months later.

The northern elephant seal ranges from Baja California to Alaska. Northern elephant seals breed from Baja California to the Farallon Islands in California. Mating takes place from December to March, and females give birth to a single pup after a gestation period of 11.5 months.

The Guadalupe fur seal occurs primarily off Isla Guadalupe, Baja California, though its former range extended as far north as the Farallon Islands near San Francisco. Recently small populations have been seen off of Baja California and hauling out rarely occurs on the California Channel Islands. The breeding biology of this species is similar to that of the northern fur seal.

Several species of whales and dolphins of the Southwest Pacific Zone generally prefer offshore waters, but may be seen in coastal waters: killer whales, minke whales, Dall porpoises, Pacific white-sided dolphins, common dolphins, pygmy sperm whales, pilot whales, northern right whale dolphins, and bottlenose dolphins. Killer whales and minke whales also may be found nearshore all along the coast, although killer whales are more abundant in the Northwest Pacific Zone. Several additional marine mammals occurring within the Southwest Pacific Zone are classified by the Federal Government as threatened or endangered and are discussed under Species with Special Status (part 4.2.1).

4.2.3 Terrestrial Resources

The Southwest Pacific Zone is rich in terrestrial resources, but the population size of many species is decreasing due to continued development and urbanization. The diverse habitats within the coastal zone harbor a large variety of terrestrial flora and fauna. The California Channel Islands and the Farallon Islands are important shorebird and seabird breeding areas and support a variety of unique flora and fauna.

Plants

Most of the plants mapped in the Southwest Pacific Zone are species with special status. Torrey pines and the pygmy forest will be covered in the geographic inventory of each area in which they are found.

Invertebrates

The monarch butterfly is found throughout North America. The butterflies move northward during spring and summer, passing through two or three generations, and the descendents migrate southward in the fall. Those migrating southward along the Pacific coast establish overwintering aggregations in groves of trees between Sonoma County, California, and Mexico. This species is commercially important as a tourist attraction and is protected by local laws in some areas.

Birds

Coastal wetlands, freshwater marshes, coastal bays, forests, and offshore islands and rocks all occur within the Southwest Pacific Zone. Within these habitats, birds are one of the more conspicuous and important terrestrial groups. The large avian population of the Southwest Pacific Zone consists of shorebirds, wading birds, waterfowl, raptors, seabirds, and songbirds and others.

Areas mapped for bird species were selected based on the area's importance to the species within the geographic interval. Thus, no absolute population cutoff points were used throughout the inventory. The selection of mapped areas was based on published information and conversations with knowledgeable individuals concerning areas and species of importance.

a. Shorebirds. Shorebirds, including gulls, terns, sandpipers, phalaropes, plovers, and turnstones, are found around shore and intertidal areas. Some species, such as snowy plovers and American avocets, are found in the Southwest Pacific Zone throughout the year and some, such as willets and phalaropes, are winter visitors or fall and spring transients. Other species winter to the south and return in March and April to nest; egg laying and hatching generally are completed by late June, and the birds return to the south from late August through October.

Snowy plovers breed on undisturbed beaches along the coastline of the Southwest Pacific Zone, building nests in open areas of sand or mud. The breeding season begins in early April and continues until mid-to-late summer. The snowy plover is considered a species of special concern because suitable undisturbed beach habitat is decreasing.

b. Wading birds. Wading birds, including herons, egrets, bitterns, rails, and ibises, are found in both freshwater and saltwater marsh areas of the coastal zone. Most species are resident and breed during the spring and summer months. Some, like the wood stork, are summer visitors.

c. Waterfowl. Loons, grebes, swans, geese, and four groups of ducks make up the waterfowl category. Dabbling ducks are surface-feeders commonly found in freshwater and saltwater marshes; they include mallards, pintails, and teals. Diving ducks, or bay ducks, dive from the surface and feed under water. They are found most often in coastal bays and river mouths, and include canvasbacks, scaups, and goldeneyes. Sea ducks are usually seen along the coast or at sea, and include oldsquaws, scoters, and eiders. The three North American species of mergansers are fish-eating ducks with a long, thin, serrated bill. Many species of waterfowl are winter visitors to the Southwest Pacific Zone although some, for example, the green-winged teal, occasionally breed in the zone. Some species, for example, the eared grebe, are residents. Waterfowl are important as aesthetic, recreational, and economic resources.

d. Raptors. Raptors include vultures, hawks, falcons, eagles, and owls. Owls are generally residents of wooded areas, although several species are found in coastal areas or open fields and meadows. Most hawks, vultures, eagles, and falcons are residents, although a few, such as the bald eagle, are winter visitors.

White-tailed kites are year-round residents of the Southwest Pacific Zone; they are of special interest because of their drastic decrease and then recent increase in population size. Ospreys are now primarily spring and fall transients through the Southwest Pacific Zone, although they formerly nested on the larger offshore islands of the zone. The spotted owl generally resides in old growth timber in coniferous forests. This habitat-type is declining in the zone and spotted owls are considered a species of special concern.

e. Seabirds. Seabirds include albatrosses, pelicans, shearwaters, storm petrels, cormorants, and alcids. Most are pelagic species, normally coming to land only to breed. Many of the mapped species, such as Brandt's cormorants, ashy storm petrels, and Cassin's auklets, nest within the coastal zone; some storm petrels and all shearwaters and albatrosses are perennial visitors or transients. Although courtship may begin as early as March, most nesting and egg laying does not occur until May or June in the Southwest Pacific Zone. Offshore islands, islets, rocks, and coastal cliffs are the major breeding areas for this group.

f. Songbirds and others. This category includes all of the passerines (perching birds) and a variety of other birds such as woodpeckers, doves, and quail. Some species are important as recreational and economic resources, especially the gallinaceous species such as quail and grouse. Others are aesthetically and recreationally important and are sought out by birdwatchers and photographers. Many species, such as doves and quail, are resident, breeding in the spring and early summer, or in late winter after the first rains. Many species, such as warblers, pass through the Southwest Pacific Zone as they migrate along the Pacific Flyway. These are generally fall and spring transients or visitors during summer or winter.

Black swifts and bank swallows are species of special concern because of their low population levels. Black swifts tend to nest on sea cliffs and steep-walled canyons with nearby waterfalls, generally during the summer months. Bank swallows dig nest burrows in soft banks or bluffs from April to September.

Reptiles and Amphibians

A large variety of reptiles and amphibians are found within the Southwest Pacific Zone. Although many of these species are very abundant, some species are being threatened by destruction of their limited habitat or by steady or increased removal of individuals by reptile and amphibian collectors. Several species which have decreasing populations are of special concern and are mapped. Some species, especially the snakes, may have fairly extensive home ranges, but most are relatively sedentary. Most reptiles and amphibians do not migrate extensively, although some salamanders will travel several miles to breeding streams. Aquatic habitats, especially freshwater areas, are extremely important as breeding and feeding areas to many of these animals.

Mammals

Important mammals of the Southwest Pacific Zone include mule deer, gray foxes, bobcats, mountain lions, raccoons, black bears, and wild boars. Most of the mammalian species are more likely to be found in the less developed areas within the zone, but some species are either indifferent to or actively seek out urbanized areas. Although a few species form large groups or herds, most are found in pairs or small family groups.

The mule deer is the most important big game species in the Southwest Pacific Zone. Although three subspecies of mule deer are found within the Southwest Pacific Zone, the ranges somewhat overlap and no distinction is made in this zone in the context of the maps or this report. Individuals and small groups may be seen throughout the region, but larger groups tend to concentrate in protected areas such as state parks.

Low numbers of black bears, another big game species, are also found throughout the undeveloped areas of the zone. Discrete groups of wild boars are also an important game animal, especially on some of the California Channel Islands.

4.3 SOUTHERN CALIFORNIA COAST (Grid Reference MF89 to GP31)

The Southern California Coast section of the Southwest Pacific Zone extends from the United States-Mexico border to Point Conception, California. Coastal wetlands, sandy beaches, and offshore islands, rocks, and islets provide an attractive environment for many species. Upland areas are generally covered with coastal sage scrub or chaparral, although some areas are forested with coniferous or mixed coniferous and hardwood trees. The biotic resources for this section are keyed geographically using west-east UTM grid swaths.

4.3.1 Aquatic Resources

Widespread Species

Giant kelp, a valuable commercial plant, is found on rocky subtidal substrates along the entire length of the Southern California Coast section. This algae represents critical habitat for many varieties of fish and invertebrates.

Abalone, especially red abalone, and spiny lobster are found generally on all rocky habitats in the Southern California Coast section and are highly valued as commercial and sport species. Pismo clams are found intertidally on most sandy beaches in this section.

Rockfish, lingcod, California halibut, kelp and barred sand bass, Pacific bonita, yellowtail, cabezon, Pacific barracuda, California sheephead, and croakers are the primary targets of extensive commercial and recreational fisheries in the Southern California Coast section.

Geographic Inventory

The green sea turtle is an occasional visitor to San Diego Bay (grid reference MG80 through MG71). This bay is also the site for extensive commercial fishing for northern anchovy, Pacific sardines, and striped mullet. Grunion also spawn in this bay and on approximately 14 other sandy beaches in the Southern California Coast section.

White seabass and Pacific barracuda are known to spawn in late spring and summer near the mouth of San Diego Bay (grid reference MG81).

Squid, which represents a small portion of the California fishery, is known to spawn in January off La Jolla, California (grid reference MG73). This portion of the coastline is also the location of sizable areas of surfgrass and feather boa kelp.

Agua Hedionda, a marsh at grid reference MG66, supports populations of eelgrass and common littleneck clams.

The northernmost point of the striped mullet fishery is off Oceanside, California, at grid reference MG57 through MG48.

Heisler Park Ecological Reserve (grid reference MH21) contains large stands of surfgrass and feather boa kelp and also supports populations of rock scallops and ghost shrimp.

Crab fishing is an important year-round commercial enterprise outside the breakwater of Los Angeles Harbor (grid reference LH83 to LH93) and also off of Palos Verdes (grid reference LH63). Los Angeles Harbor is also the site for a major northern anchovy fishery.

The Santa Clara River (grid reference KH99) is one of two significant anadromous fish streams in the Southern California Coast section. This stream is used primarily by steelhead in early spring.

Coho salmon, a sport fish species, is found in late spring and early summer off the Oxnard and Ventura coasts, grid reference LH06 and KH89, respectively.

There are only a few significant sites on the mainland noted in the Southern California Coast section where seals haul out onto the beach and rocks. Two haulout sites, at grid reference LH07 and KJ60, are primarily used by harbor seals.

Crab fishing is an important fishery near Santa Barbara (grid reference KJ51).

Giant kelp is commercially harvested between grid reference GP71 and GP31 in water depths of approximately 9 to 18 meters (30 to 60 feet).

Gaviota Creek (grid reference GP51) is the second of two significant anadromous fish streams in the Southern California Coast section; it is used primarily by steelhead.

The California Channel Islands, eight major islands between grid reference LG73 and GN37, are renowned for their excellent sport fishing. Many varieties of sport fish are taken every year from these offshore islands including speckled sanddabs, many species of shark, white seabass, tunas, sculpins, ocean whitefish, and swordfish.

Marine mammals utilize these islands for breeding and hauling out and the offshore waters for feeding and recreation. Pinnipeds using these islands include the California sea lion, harbor seal, and elephant seal. Cetaceans utilizing the offshore waters include the minke whale, Dall porpoise, Pacific white-sided dolphin, common dolphin, pilot whale, and northern right whale dolphin.

Santa Catalina Island (grid reference LG58) supports a population of purple coral. Several species of abalone also occur in the area.

There are numerous haulout and breeding areas for California sea lions and harbor seals on the Channel Islands of Anacapa, Santa Cruz, Santa Rosa, and San Miguel (grid reference KH68 to GN36). In addition, northern fur seal, Steller sea lion, and northern elephant seal haul out and breed on the western end of San Miguel Island (grid reference GN36).

4.3.2 Terrestrial Resources

Widespread Species

A number of terrestrial plant species with special status occur in the Southern California Coast section. These species are identified by their family names on the accompanying maps; specific species locations are provided in the notebox on each map and in Table 8.

Table 8. Inventory of terrestrial plant species with special status in the Southern California Coast section.*

Grid reference	Map number	Species
MG80	408	Salt marsh bird's beak
MG90	402	Otay tarweed
MG90	408	Salt marsh bird's beak
MG90	417	California orcuttia
MG71	418	Orcutt's chorizanthe
MG81	408	Salt marsh bird's beak
MG82	401	San Diego coyote thistle
MG82	412	San Diego County monardella
MG82	412	San Diego mesa mint
MG92	412	San Diego mesa mint
MG83	401	San Diego coyote thistle
MG83	412	San Diego mesa mint
MG83	418	Orcutt's chorizanthe
MG74	418	Orcutt's chorizanthe
MG84	401	San Diego coyote thistle
MG75	418	Orcutt's chorizanthe
MG86	401	San Diego coyote thistle
MG68	401	San Diego coyote thistle
MH30	406	Laguna Beach dudleya
MH21	406	Laguna Beach dudleya
MH12	406	Laguna Beach dudleya
MH12	408	Salt marsh bird's beak
MH02	408	Salt marsh bird's beak
LH93	408	Salt marsh bird's beak
LH37	402	Santa Susana tarweed
LH37	406	Santa Monica Mountains dudleya
LH27	406	Santa Monica Mountains dudleya
LH27	418	Conejo buckwheat
LH18	418	Conejo buckwheat
LH07	408	Salt marsh bird's beak
KH98	408	Salt marsh bird's beak
KH99	408	Salt marsh bird's beak
KJ60	408	Salt marsh bird's beak
KJ52	410	Santa Barbara false-lupine
KJ22	410	Santa Barbara false-lupine
GP72	410	Santa Barbara false-lupine
GP41	411	Lompoc yerba santa
GP31	411	Lompoc yerba santa
LG73	408	San Clemente Island paintbrush
LG73	410	Trask's island lotus
LG73	419	San Clemente Island larkspur
LG63	408	San Clemente Island paintbrush
LG64	408	San Clemente Island paintbrush

continued

Table 8 (concluded).

Grid reference	Map number	Species
LG54	415	San Clemente Island bush-mallow
LG55	410	Trask's island lotus
LH10	406	Santa Barbara Island dudleya
LH10	410	Trask's milk-vetch
LH10	418	Santa Barbara Island buckwheat
LH00	418	Santa Barbara Island buckwheat
KG77	410	Trask's island lotus
KG77	418	San Nicolas Island buckwheat
KG78	418	San Nicolas Island buckwheat
KG68	410	Trask's island lotus
KG67	418	San Nicolas Island buckwheat
KG68	418	San Nicolas Island buckwheat
KH56	400	Island bedstraw
KH46	403	Island barberry
KH47	400	Island bedstraw
KH36	415	Santa Cruz Island bush-mallow
KH37	406	Santa Cruz Island dudleya
GN76	400	Island bedstraw
GN66	403	Island barberry
GN47	400	Island bedstraw

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[*] See also Table 7 and Appendix.

Concentrations of migrating and overwintering shorebirds and waterfowl are found in coastal wetlands and inland lakes and rivers throughout the Southern California Coast section. Shorebirds and seabirds nest on the coastal cliffs and offshore islands, islets, and rocks. A large variety of avian species utilize the coastal zone as they migrate along the Pacific Flyway.

Mammals are widespread and are found year-round, generally in the less urbanized areas. Mule deer, black bears, gray foxes, raccoons, mountain lions, and bobcats may be found throughout the region. Population numbers of most of these species are normally fairly low in any one area.

Geographic Inventory

The area between grid reference MF89 and MG80 supports several important species. This is one of the few areas in the Southern California Coast section in which California black rails are found. Light-footed clapper rails, Belding savannah sparrows, Forster's terns, and snowy plovers are residents of this area. California least terns and Caspian terns nest here in late spring through summer. This is the only nesting location of elegant terns in the United States and one of the few nesting areas for black skimmers in California; both nest in late spring and summer. Osprey, golden eagles, and orangethroat whiptails may be seen in the area. This area also supports many overwintering shorebirds and waterfowl.

The area between grid reference MG71 and MG72 is important to water-associate birds. It is one of the major waterfowl overwintering areas in the Southern California Coast section, and supports numerous wintering shorebirds, also. Orangethroat whiptails, are declining due to habitat destruction, and this is one of the few locations in which they may be seen. Light-footed clapper rails, Belding savannah sparrows, snowy plovers, great blue herons, and black-crowned night herons occur here year-round; California least terns nest in this area in late spring and summer.

Torrey pines are only found in two areas in the Southern California Coast section, one of which is between grid reference MG73 and MG74. Light-footed clapper rails, Belding savannah sparrows, white-tailed kites, and black-crowned night herons are year-round residents; California least terns nest in this area in late spring and summer. Wintering shorebirds and waterfowl also are found here in several locations.

California least terns, which are present in late spring and summer, light-footed clapper rails, Belding savannah sparrows, and snowy plovers nest in the area at grid reference MG75.

These four species also nest in the area at grid reference MG66, along with egrets and black-crowned night herons. A large concentration of white-tailed kites are seen in this area year-round, as well as numerous wintering waterfowl and shorebirds. Wood storks are an uncommon post-breeding visitor.

An important area for migrating and wintering waterfowl is found in the area at grid reference MG67. This is also the location of the southernmost coastal nesting population of least Bell's vireos. California least terns, light-footed clapper rails, Belding savannah sparrows, and snowy plovers nest within this area, and wood storks are uncommon post-breeding visitors. California brown pelicans and double-crested cormorants migrate through the area.

Least Bell's vireos nest in late spring and summer within the area between grid reference MG58 and MG49. Orangethroat whiptails also may be seen here.

California least terns nest in the area at grid reference MH20 in late spring and summer.

In the area at grid reference MH02 and MH12, California least terns, light-footed clapper rails, California black rails, Belding savannah sparrows, and snowy plovers are found nesting. Concentrations of white-tailed kites may be seen. This is also an important migration and wintering area for shorebirds and waterfowl. The coast horned lizard, a very sensitive species, may be seen here; habitat destruction and a decline in the population of the prey species has led to a decrease in numbers of this lizard. Monarch butterflies are seen here during their migration and may overwinter in the area.

California least terns, light-footed clapper rails, and Belding savannah sparrows nest in the area at grid reference LH93 and a variety of shorebirds and waterfowl overwinter here. Coast horned lizards may also be seen here

The area at grid reference LH63 is the only area in which the Palos Verdes blue butterfly is found.

The only two colonies of El Segundo blue butterflies are found in the area at grid reference LH65. Coast horned lizards may be found in this area, also. California least terns and Belding savannah sparrows nest in the area between grid reference LH55 and LH16. Large numbers of burrowing owls reside and nest at grid reference LH65, and a variety of other raptors winter in this area.

California least terns, Belding savannah sparrows, California black rails, light-footed clapper rails, and snowy plovers nest at grid reference LH07 and California brown pelicans migrate through the area. An introduced population of red foxes resides here. The red-legged frog, a species of special concern due to population decline, is also found in this area. A large variety of raptors winter and nest in the Santa Monica Mountains, and the area is considered to be the southern extent of the range of the California condor.

California least terns and Belding savannah sparrows nest in the area between grid reference KH98 and KH89. California brown pelicans migrate through the area and a variety of wintering shorebirds also is found here.

Wintering waterfowl and shorebirds are found in the area between grid reference KJ60 and KJ31. Great blue herons nest here as do light-footed clapper rails, California black rails, least Bell's vireos, and Belding savannah sparrows; this area is currently considered to be the northern extent of the breeding range of the light-footed clapper rail and the Belding savannah sparrow. California brown pelicans migrate through this area. American peregrine falcons may potentially nest in this part of the coastal zone.

The California Channel Islands (grid reference LG73 to GN36) are rich in terrestrial resources and support many unique species. They are used fairly extensively by avian fauna, particularly in late spring and summer by nesting shorebirds and seabirds.

San Clemente Island (grid reference LG73 to LG55) is the only area in which the San Clemente loggerhead shrike and the San Clemente sage sparrow are found. Insular gray foxes and island night lizards also are found here. Chukars and wild boars have been introduced on the island.

Bald eagles have been reintroduced and turkeys and wild boars have been introduced on Santa Catalina Island (grid reference LG78 to LH50). Insular gray foxes, and possibly island night lizards, are found on this island.

Santa Barbara Island is within grid reference LH10 and Sutil Island (a small rock offshore) is in grid reference LH00. This island and islet are the only areas in California in which the black storm petrel nests, usually in late spring and summer. Island night lizards are found in both areas. One of the few current California brown pelican nesting areas is found on Santa Barbara Island.

San Nicolas Island is between grid reference KG77 and KG68. Insular gray foxes and island night lizards reside here. Chukar have been introduced on the island.

Anacapa Island is actually composed of three islands, which are between grid reference KH86 and KH76. This is the major breeding area for the California brown pelican in California; pelicans are found here in spring and summer.

Santa Cruz Island is located between grid reference KH66 and KH37. Insular gray foxes reside here. Turkeys and wild boars have been introduced on the island.

Santa Rosa Island is between grid reference KH25 and GN56. Insular gray foxes reside here; wild boars have been introduced. This is the second of only two locations in which Torrey pines are found in the Southern California Coast section.

Insular gray foxes reside on Santa Miguel Island (grid reference GN46 to GN37).

Potential nesting sites for American peregrine falcons are found on the four northern Channel Islands (Anacapa, Santa Cruz, Santa Rosa, and San Miguel). Due to the sensitivity of this species, no nests were mapped in the Southern California Coast section.

4.4 CENTRAL CALIFORNIA COAST EXCLUDING SAN FRANCISCO BAY (Grid Reference GP12 to CV87)

The Central California Coast section of the Southwest Pacific Zone extends from Point Conception to Cape Mendocino, California, excluding the San Francisco Bay area. It includes coastal wetlands, coastal and upland forests of conifers or mixed conifers and hardwoods, offshore rocks and islets, and the

Farallon Islands. The biotic resources for this section are keyed geographically using west-east UTM grid swaths.

4.4.1 Aquatic Resources

Widespread Species

Except where kelp is harvested south of Monterey Bay, aquatic plants have little commercial value in the Central California Coast section, but represent important habitat for a variety of species. Crab, abalone, and sea urchin utilize kelp beds for protection and food. In addition, many species of fish are found in and around kelp beds, including the important sport fish, lingcod and cabezon. The threatened southern sea otter also resides in kelp beds.

Shrimp are fished commercially along this entire section of coast, but predominantly north of Monterey (grid reference ER95). Salmon, rockfish, crab, and California halibut are important commercial fisheries of this section.

The Central California Coast section encompasses at least 35 important rivers and creeks which support habitat for anadromous fish, including salmon, steelhead, striped bass, American shad, and Pacific lamprey. These species, plus the starry flounder, represent the important sport fish of bays and estuaries along this coast.

Additionally, there are more than 50 pinniped haulout and breeding locations in the Central California Coast section. Pinnipeds utilizing this coastline include the California sea lion, the Steller sea lion, the harbor seal, the elephant seal, and the Guadalupe fur seal.

Geographic Inventory

Pismo clams and California grunions occur on most sandy beaches south of Monterey (grid reference ER95) in the Central California Coast section.

San Antonio Creek, north of Point Conception at grid reference GP15, is the only stream within the study area where the endangered unarmored threespine stickleback occurs. Grunion spawn in spring and summer on the sandy beach along the coast in this area.

The rocky area south of Point Sal (grid reference GP16) has extensive populations of rock scallops and red and black abalones, which are important sport fishing species.

The southernmost large bull kelp bed is found along the coastline between grid reference GP09 and FQ90.

A sandy beach at grid reference FQ92 is considered to be the southernmost spawning area for smelts. Smelts usually are present during the summer months in this area.

Common littleneck clams are abundant intertidally at grid reference FQ64 through FQ55.

Squid are known to spawn between grid reference FR00 and ER95 during April. This also is an important area for southern sea otters.

Elkhorn Slough (grid reference FR17 to FR07) has sizable populations of oysters, gaper clams, soft-shelled clams, common littleneck clams, and Pismo clams. Purple coral is found along the coast off Elkhorn Slough (grid reference FR07).

Purple coral also is found along the Pacific Grove coast (grid reference ER94 to ER95). Extensive shellfish beds are found in the bays and estuaries along this coast. Gray whales often are seen near shore off the Monterey Peninsula (grid reference ER94) during their annual migrations.

Año Nuevo Island (grid reference ES50) is probably the most important pinniped breeding ground in the Central California Coast section.

Another major pinniped breeding and haulout area is the Farallon Islands (grid reference DS97 to DS88). Minke whales, Dall porpoises, and killer whales migrate in the vicinity of the Farallon Islands.

Bolinas Bay (grid reference ES29) contains beds of gaper and common littleneck clams.

Mussels and gaper, soft-shelled, common littleneck, and geoduck clams are found in Tomales and Drakes Bay (grid references ET11 to ET03 and ET00 to ET01, respectively). Oysters are also found in Drakes Bay. California freshwater shrimp occur in nearby Lagunitas Creek (grid reference ET21).

California freshwater shrimp also occur in Salmon and East Austin Creeks (grid references DT94 and DT96, respectively).

Flatfish are fished extensively for sport north of Mendocino Bay (grid reference DU25 to DU28).

Tributaries of the South Fork Eel River (grid reference DU48 to DV32) are important spawning areas for chinook salmon, coho salmon, and steelhead trout.

Rock scallops are taken for sport in the vicinity of Point Delgada (grid reference DV03).

The Mattole River (grid reference DV12 to CV86) is a significant spawning stream for chinook salmon, coho salmon, and steelhead trout.

4.4.2 Terrestrial Resources

Widespread Species

A number of terrestrial plant species with special status occur in the Central California Coast section. These species are identified by their family names on the accompanying maps; specific species locations are provided in the notebox on each map and in Table 9.

Table 9. Inventory of terrestrial plant species with special status in the Central California Coast section.*

Grid reference	Map number	Species
GP24	411	Lompoc yerba santa
GP34	411	Lompoc yerba santa
GP28	416	Pismo clarkia
GP29	416	Pismo clarkia
GP19	411	Indian Knob Mountain balm
GP19	416	Pismo clarkia
GQ00	401	Adobe sanicle
GQ01	401	Adobe sanicle
FQ55	401	Adobe sanicle
FQ55	409	Hearst's manzanita
FQ55	413	Dwarf golden star
FQ55	420	Hearst's ceanothus
FQ55	420	Maritime ceanothus
FQ39	418	Butterworth's buckwheat
FR20	408	Dudley's lousewort
ER91	409	Hanging gardens manzanita
ER92	409	Hanging gardens manzanita
FR02	408	Dudley's lousewort
ER93	408	Monterey Dune monkey flower
ER94	410	Monterey clover
ER94	421	Hickman's cinquefoil
ER95	408	Monterey Dune monkey flower
ER95	410	Monterey clover
ER95	410	Pacific Grove clover
ER95	421	Hickman's cinquefoil
FR05	405	Santa Cruz wallflower
FR18	402	Santa Cruz tarweed
FR08	402	Santa Cruz tarweed
ER99	402	Santa Cruz tarweed
ER99	408	Dudley's lousewort
ER89	402	Santa Cruz tarweed
ER89	405	Santa Cruz wallflower
ES80	405	Santa Cruz wallflower
ES70	405	Santa Cruz wallflower
ES70	407	Santa Cruz cypress
ES71	407	Santa Cruz cypress
ES62	407	Santa Cruz cypress
ES47	409	Presidio manzanita
ES39	420	Mason's ceanothus
DT90	402	Point Reyes blennosperma
ET20	417	Hoover's semaphore grass
ET30	417	Hoover's semaphore grass
ET01	402	Point Reyes blennosperma
ET11	409	Pacific manzanita

continued

Table 9 (concluded).

Grid reference	Map number	Species
ET22	419	Baker's larkspur
ET02	402	Point Reyes blennosperma
ET03	402	Point Reyes blennosperma
ET03	417	Marin bent-grass
ET03	419	Yellow larkspur
ET13	414	Cunningham Marsh meadow foam
DT94	419	Yellow larkspur
ET04	419	Yellow larkspur
DT95	409	Baker's manzanita
ET05	408	Pennell's bird's beak
ET05	409	Baker's manzanita
ET05	419	Baker's larkspur
DT67	419	Yellow larkspur
DT49	413	Roderick's fritillary
DU40	413	Roderick's fritillary
DU39	417	Leafy reed-grass
DV12	417	Leafy reed-grass
DV03	417	Leafy reed-grass
CV86	417	Leafy reed-grass
CV96	417	Leafy reed-grass

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*See also Table 7 and Appendix.

Concentrations of migrating and overwintering shorebirds and waterfowl are found in coastal wetlands and inland lakes and rivers throughout this area. Shorebirds and seabirds nest on the coastal cliffs and offshore rocks and islets found the length of the Central California Coast section. A large variety of avian species utilize the coastal zone as they migrate along the Pacific Flyway.

American peregrine falcons may nest throughout the Central California Coast section, but no nests (with the exception of the one previously mentioned in part 4.2.1) were mapped, due to the sensitivity of this species.

Mammals are widespread and are found year-round, generally in the less urbanized areas. Mule deer, mountain lions, raccoons, squirrels, and black bears may be found throughout the region, although normally in fairly low concentrations.

Geographic Inventory

Between grid reference GP13 and GP15 are areas utilized by overwintering shorebirds and waterfowl. There are also California least terns nesting here in late spring and summer and snowy plovers are year-round residents. This is the northern extent of the coastal breeding range of least Bell's vireo.

California least terns and snowy plovers also nest within grid reference GP17. Shorebird and waterfowl wintering sites are located within this area as well as within grid reference GP18 and GP19. One of two known nesting sites for Heermann's gulls in California is at grid reference GP19.

The area between grid reference FQ90 and FQ91 supports several important species. Snowy plovers nest in this area, and California black rails and California clapper rails have been found here. This is the only area in which an American peregrine falcon nesting site is mapped; because of the sensitivity of the species, other nesting locations were not mapped, but this aerie location is well known to the general public. Resident breeding colonies of great blue herons and black-crowned night herons also are found here. This is the only area in which the Morro Bay kangaroo rat is found; the mapped area includes the Federal Government's designated critical habitat for this species. Finally, this is an important wintering area for shorebirds and waterfowl. It is one of the five major wintering and staging areas for brant in California.

Colonies of Smith's blue butterflies are found between grid reference FQ38 and FR10.

Smith's blue butterfly colonies are also found in the area between grid reference ER94 and FR06, and the area contains one of the largest and best-known monarch butterfly wintering areas. This is the major area in which the black legless lizard is found. Another resident snowy plover nesting area occurs here as well as wintering shorebird and waterfowl areas. A variety of owls and concentrations of 40 or more post-breeding California brown pelicans are frequently seen within this region.

Several important species are found within the area between grid reference FR07 and ER88. Snowy plovers and black swifts nest in this area in late spring and summer, and it is the southernmost area in which the California clapper rail has bred in recent years. Monarch butterflies winter in the area. The Santa Cruz long-toed salamander also occurs here.

The Santa Cruz long-toed salamander also is found between grid reference ER69 and ES50. These locations and the location mentioned in the previous paragraph are the only areas in which this species occurs.

In the area between grid reference ER69 and ES52, there are several resident snowy plover nesting sites and a great blue heron rookery. Black swifts and bank swallows nest here in late spring and summer. One of the first marbled murrelet nesting sites ever found also is located in this area. There is an important raptor wintering area, and there are several overwintering areas for shorebirds and waterfowl. The San Francisco garter snake also occurs here and at grid reference ES63.

The northern extent of the California condor's range occurs at grid reference ES44. Colonies of the San Bruno elfin butterfly are found between grid reference ES44 and ES46, and bank swallows nest here. The San Francisco garter snake occurs in parts of the San Francisco State Fish and Game Refuge here.

The Farallon Islands (grid reference ES07 to DS98) are the most important nesting area for seabirds and shorebirds in California; nesting generally occurs in late spring and summer. Post-breeding California brown pelicans are also found here. A large variety of vagrant birds, especially passerines, may be seen during the fall and spring migration period.

Concentrations of monarch butterflies winter at grid reference ES39.

Great blue heron rookeries and snowy plover nesting occur between grid reference ET01 and DT93. Very large concentrations of wintering bald eagles may be seen at Tomales Bay (grid reference ET11 to ET03), along with wintering populations of shorebirds and waterfowl.

Ospreys and wintering bald eagles may be seen in the area between grid reference DT94 and DT76. Resident snowy plovers nest here, and a variety of wintering and migrating shorebirds and waterfowl occur. This area is the southern extent of the pygmy forest.

Wintering bald eagles and nesting ospreys also are found between grid reference DT67 and DT49. Shorebirds and waterfowl migrate through and winter in this area, also.

Mountain beavers reside between grid reference DU30 and DU31. Bald eagles, shorebirds, and waterfowl winter here, whereas great blue herons are year-round residents.

The major stands of the pygmy forest are found in the area between grid reference DU33 and DU26. Each stand of pygmy forest is composed of a variety of dwarfed plant species growing in areas of mineral-poor soil. The pygmy forest is interspersed among the "normal" forest growing on the marine terraces along this section of the coast. Also found within this area are resident great blue heron rookeries, wintering bald eagles, wintering shorebirds and waterfowl, and colonies of the lotis blue butterfly. Grid reference DU35 is the only area in which the lotis blue butterfly is found.

Bald eagles, shorebirds, and waterfowl also winter in the area between grid reference DU37 and DU29. It is an important deer fawning area and a snowy plover nesting site.

Other bald eagle wintering areas occur between grid reference DV12 and CV87.

4.5 SAN FRANCISCO BAY (Grid Reference ES83 to FT29)

The San Francisco Bay section of the Southwest Pacific Zone encompasses south, central, and north San Francisco Bay, San Pablo Bay, the San Joaquin River delta, and the Sacramento River under tidal influence. The biotic resources for this section are keyed geographically generally using west-east UTM grid swaths.

4.5.1 Aquatic Resources

Widespread Species

Striped bass and sturgeon are distributed throughout the bay and delta regions and provide extensive recreational sport fishing. Common littleneck and soft-shelled clams and harbor seals are found throughout San Francisco Bay.

Geographic Inventory

South San Francisco Bay (grid reference ES84 to ES75) is an important harbor seal breeding and haulout location.

Bay shrimp are abundant and compose a small commercial fishery in the South Bay area near grid reference ES84. A small but distinct fishery for the longjaw mudsucker and sharks also occurs in South San Francisco Bay between grid reference ES84 and ES58.

Northern anchovy and Pacific herring are commercially important in San Francisco Bay in the vicinity of grid reference ES58. Pacific herring spawn in winter or early spring in the shore areas adjacent to the commercial fishery. The bay is also an important flatfish nursery area.

Starry flounder and surfperch are important sport fish in San Pablo Bay (grid reference ET51).

The San Joaquin delta area, east of San Francisco Bay between grid reference ET06 and FT14, is habitat for all anadromous fish species in the San Francisco Bay section. Chinook salmon, steelhead trout, striped bass, Pacific lamprey, white sturgeon, and American shad are all present.

4.5.2 Terrestrial Resources

Widespread Species

A number of terrestrial plant species with special status occur in the San Francisco Bay section. These species are identified by their family names on the accompanying maps; specific species locations are provided in the notebox on each map and in Table 10.

Concentrations of migrating and overwintering shorebirds and waterfowl are found in the coastal wetlands and inland lakes and rivers. A large variety of avian species utilize the coastal zone as they migrate along the Pacific Flyway.

Mammals are seen year-round in the unurbanized areas. They include mule deer, occasional mountain lions and bobcats, raccoons, and squirrels. Some species, such as mule deer and raccoons, are commonly found in urbanized areas close to wild areas.

Geographic Inventory

The northern extent of the range of the California condor occurs at grid reference ES44.

The area between grid reference ES64 and ES56 supports many important species. California least terns and California clapper rails nest within this area, as do snowy plovers, Caspian terns, Forster's terns, herons, and egrets. Concentrations of post-breeding California brown pelicans may be seen here. This is the southern extent of the salt-marsh harvest mouse's range. The San Francisco garter snake and the Alameda striped racer may be seen in this area.

Mission blue butterfly colonies and a San Bruno elfin butterfly colony are found in the area at grid reference ES57. California least terns and California clapper rails nest in this area. The San Francisco garter snake and the salt-marsh harvest mouse may be seen in this area.

The northernmost nesting area for the California least tern is found at grid reference ES48. One of two known nesting sites for Heermann's gulls in California is here, also, and California clapper rails nest in this area. Salt-marsh harvest mice and Alameda striped racers also are found here.

Resident California clapper rails nest in the area at grid reference ES39, and salt-marsh harvest mice reside here.

The entire San Francisco Bay area, between grid reference ET30 and FT26, including the marshes north of San Pablo Bay, the San Joaquin delta, and parts of the lower, tidal Sacramento River, is a very important shorebird and waterfowl migration and overwintering area. A large proportion of diving ducks, especially canvasbacks, feed and rest here as they migrate along the Pacific Flyway. The tidal mudflats are the most important habitat on the California coast for shorebirds as they migrate from their Arctic breeding grounds.

Table 10. Inventory of terrestrial plant species with special status in the San Francisco Bay section.*

Grid reference	Map number	Species
ES64	412	San Mateo thornmint
ES55	402	Fountain thistle
ES55	412	San Mateo thornmint
ES56	409	San Bruno Mountain manzanita
ES57	402	Point Reyes blennosperma
ES57	409	San Bruno Mountain and Pacific manzanitas
ES48	404	San Francisco allocarya
ES48	409	Presidio manzanita
ES48	416	Presidio clarkia
ES68	402	Santa Cruz tarweed
ES68	409	Alameda manzanita
ES78	409	Alameda manzanita
ES69	409	Alameda manzanita
ES49	413	Tiburon mariposa
ET30	417	Hoover's semaphore grass
ET60	402	Santa Cruz tarweed
ET60	409	Alameda manzanita
ET32	408	Soft bird's beak
ET50	408	Soft bird's beak
ET61	408	Soft bird's beak
ET70	408	Soft bird's beak
ET71	408	Soft bird's beak
ET83	401	Mason's lilaeopsis
ET91	408	Soft bird's beak
FT01	401	Mason's lilaeopsis
FT11	401	Mason's lilaeopsis
FT11	416	Antioch Dunes evening-primrose
FT12	401	Mason's lilaeopsis
FT00	405	Contra Costa wallflower
FT00	416	Antioch Dunes evening-primrose
FT10	401	Mason's lilaeopsis
FT30	401	Mason's lilaeopsis

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*See also Table 7 and Appendix.

Within the area north and east of San Pablo Bay, between grid reference ET30 and ET33, a variety of species is found. California black rails and California clapper rails nest here and salt-marsh harvest mice reside here; this is the northern extent of the ranges of all three species. The California tiger salamander, and occasionally beavers and river otters, may be seen here. Aleutian Canada geese pass through and may overwinter in this area, and white pelicans may be seen.

Antioch Dunes National Wildlife Refuge (grid reference FT00) comprises much of the designated critical habitat for the Antioch Dunes evening-primrose and the Contra Costa wallflower.

The San Joaquin delta and Sacramento areas (grid reference FS09 to FT26) support the only known nesting colonies of Lange's metalmark butterflies and valley elderberry longhorn beetles. California clapper rails and California black rails nest here, and Aleutian Canada geese and sandhill cranes overwinter in the area. The Alameda striped racer, salt-marsh harvest mouse, and the California tiger salamander are seen in this area. Beavers and river otters occasionally are found here, also.

4.6 LIST OF SOURCES FOR THE SOUTHWEST PACIFIC ZONE

The List of Sources has been expanded into a matrix (Table 11), linking individual reference sources to the topics for which each reference was used in the preparation of the inventory maps and report.

Table 11. List of sources for the Southwest Pacific Zone.

				AQUATIC					TERRESTRIAL									
	Special Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
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Table 11 (continued).

				AQUATIC					TERRESTRIAL									
	Special Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
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Table 11 (continued).

				AQUATIC					TERRESTRIAL									
	Special Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
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				AQUATIC					TERRESTRIAL									
	Special Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
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Table 11 (continued).

				AQUATIC					TERRESTRIAL									
	Special Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
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				AQUATIC					TERRESTRIAL									
	Special Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
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Table 11 (continued).

				AQUATIC					TERRESTRIAL									
	Special Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
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				AQUATIC					TERRESTRIAL									
	Special Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
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Table 11 (continued).

				AQUATIC					TERRESTRIAL									
	Special Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
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				AQUATIC					TERRESTRIAL									
	Social Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
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Table 11 (continued).

				AQUATIC					TERRESTRIAL									
	Special Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
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Table 11 (continued).

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Table 11 (continued).

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U.S. Fish and Wildlife Service. Concept plan for waterfowl wintering habitat preservation: California coast. 1979 February.													●					
U.S. Fish and Wildlife Service. Endangered species in coastal ecosystems. 1978 November 15.			●							●								
U.S. Fish and Wildlife Service. Selected vertebrate endangered species of the seacoast of the United States. Biological Services Program publication FWS/OBS-80/01. 1980 March.			●				●	●			●	●	●	●	●	●	●	●

continued

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Table 11 (concluded).

				AQUATIC					TERRESTRIAL									
	Special Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
U.S. Forest Service. Los Padres national forest. (Map). San Francisco, CA; 1978. 1 inch = 3 miles.	●																	
Varoujean, D.H. Seabird colony catalog: Washington, Oregon, and California. U.S. Fish and Wildlife Service, Biological Services Program, Region One; 1980.			●								●				●			
Webster, R.; Lehman, P.; Bevier, L. The birds of Santa Barbara and Ventura Counties, California. Occasional paper--Santa Barbara Museum of Natural History. 1980. Occasional paper no. 10.											●	●	●	●	●	●		
Winzler and Kelly. A summary of knowledge of the central and northern California coastal zone and offshore areas. Bureau of Land Management; 1977. 3 vols.				●	●	●		●										
Yparraguirre, D.R. Distribution, migration, and mortality of Aleutian Canada geese in California, 1978-1979. California Department of Fish and Game; 1979 September.			●										●					
York, R., California Native Plant Society/California Natural Diversity Data Base. (Personal communications). 1980-1981.			●						●									

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PART 5

NORTHWEST PACIFIC ZONE
(GRID REFERENCE CV87 TO DK72)

5.1 INTRODUCTION

For best results, much of the preparatory information in parts 1, 2, and 3 should be read before using the maps or using the information in this part. This part presents some of the physiographic, land use, and geographic features of the Northwest Pacific Zone and the characteristics and habits, not discussed in part 4, of some of the major biological resources.

5.1.1 Physical Description

The Northwest Pacific Zone (Figure 6) constitutes approximately 60 percent of the study area and extends from Cape Mendocino, California, to the United States-Canada border (grid reference CV87 to DK72). The Aleutian Current branches into the Alaska and California Currents off this portion of the coast. This zone contains three subdivisions or sections: the Pacific Northwest Coast, the Columbia River Estuary, and Puget Sound.

The ecological inventory of the Northwest Pacific Zone is covered by portions of the following USGS 1:250,000-scale maps:

- Redding, CA
- Eureka, CA
- Weed, CA-OR
- Crescent City, CA-OR
- Medford, OR-CA
- Cape Blanco, OR
- Roseburg, OR
- Coos Bay, OR
- Salem, OR
- Vancouver, WA-OR
- Hoquiam, WA-OR
- Cape Disappointment, WA-OR
- Seattle, WA
- Copalis Beach, WA
- Victoria, BC, CAN-WA, US
- Cape Flattery, WA, US-BC, CAN

The Northwest Pacific Zone has a temperate climate and shows minimal evidence of latitudinal variation in species due mainly to the moderating influence of ocean currents. Ocean depths at the three-mile limit within this zone range from 200 meters (600 feet) off Cape Blanco, Oregon, to 40 meters (120 feet) off the outer Washington coast. Estuarine areas develop in the mouths of nearly all the rivers, and uplands in the zone are forested.

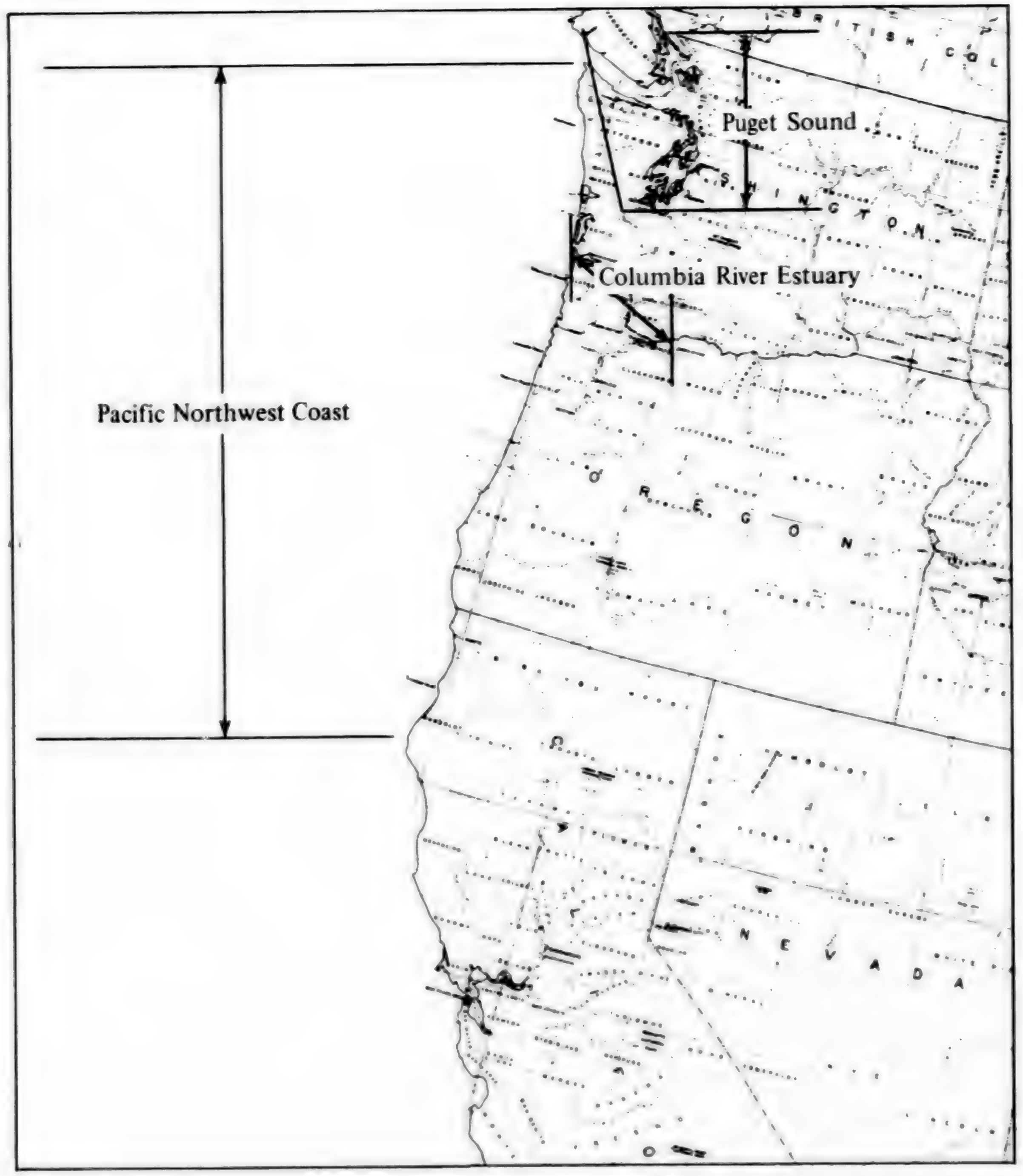

Figure 6. Major sections of the Northwest Pacific Zone.

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The Pacific Northwest Coast section consists of the outer, exposed coastline in this zone, which is characterized by numerous high-cliffed pocket beaches and a few extensive sandy or rocky beaches. The northern portion has a moderately dissected coastline with numerous rocky islands, small bays, and estuary systems containing mudflats and eelgrass beds.

The Columbia River Estuary section, bounded by Clatsop Spit and Cape Disappointment on the open coast and extending upriver to the extent of tidal influence, just below Bonneville Dam, has high freshwater inflow and an extensive inland marsh complex. The Puget Sound section, including the Strait of Juan de Fuca, the San Juan Islands, and a portion of the Strait of Georgia, is relatively protected from direct marine influence and has a highly complex coastline with numerous islands. Portions of the Strait of Georgia, Strait of Juan de Fuca, and Puget Sound have water depths in excess of 200 meters (600 feet).

5.1.2 Special Land Use Areas

The Northwest Pacific Zone contains the highly urbanized areas surrounding Puget Sound, such as Seattle, Tacoma, and Olympia, in addition to the remote and undeveloped areas of the Olympic Peninsula and the Coast Range. Extensive areas within this zone are held as public lands and a total of 235 special land use areas have been identified (Table 12).

Federal ownership has been identified for 35 of the special land use areas, ranging in size from the Klondike Gold Rush National Historical Park visitor center in downtown Seattle to the extensive lands included in national forests such as Siuslaw and Siskiyou National Forests in Oregon. State ownership has been identified for the remaining 200 special land use areas which include urban parks and historic sites, remote island parks, coastal beaches, and upland forests. Redwood National Park, Kalmiopsis Wilderness, and Olympic National Park have been designated as Class I air quality areas. Approximately 10 percent of the areas have historical significance while approximately 25 percent have significance for their natural values; over 90 percent are recreationally significant. Due to scale limitations, some of the historic sites in the urban areas of the Northwest Pacific Zone have not been shown on the maps.

5.2 RESOURCES OVERVIEW

The following paragraphs summarize locations and habits, not discussed in part 4, of the various species in the Northwest Pacific Zone. Only the more important species of the zone have been shown on the inventory maps due to scale limitations.

5.2.1 Species with Special Status

Species with special status shown on the accompanying inventory maps include only those with known distributions in the Northwest Pacific Zone which are designated as either threatened or endangered on published Federal and state lists (Table 13) and for which supporting data were available. Species proposed for consideration as endangered, threatened, or other classification are discussed only when appropriate in the applicable aquatic or terrestrial sections of this report.

Table 12. Designated land use areas for the Northwest Pacific Zone.

	Ownership/Administration			Special significance		
Name	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
CALIFORNIA						
Humboldt Bay National Wildlife Refuge	X			X		
Fort Humboldt State Historic Park		X			X	
Azalea State Reserve		X		X		
Little River State Beach		X				X
Kelp Beds at Trinidad Head Area of Special Biological Significance		X		X		
Trinidad State Beach		X				X
Patrick's Point State Park		X		X	X	X
Dry Lagoon State Park		X				X
Redwood National Park*	X			X		X
Redwood National Park Area of Special Biological Significance		X		X		
Prairie Creek Redwoods State Park		X		X		X
Del Norte Coast Redwoods State Park		X		X		X
Jedediah Smith Redwoods State Park		X		X		X
Six Rivers National Forest	X			X		X
Pelican State Beach		X				X
CALIFORNIA-OREGON						
Siskiyou National Forest	X			X		X

---

* Class I air quality area.

continued

Table 12 (continued).

Name	Ownership/Administration			Special significance		
	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
OREGON						
Oregon Caves National Monument	X			X		X
Kalmiopsis Wilderness*	X			X		X
Azalea State Park		X		X		X
Harris Beach State Park		X				X
Oregon Islands National Wildlife Refuge	X			X		
Intertidal Non-food Permit Area		X		X		
Loeb State Park		X				X
Samuel H. Boardman State Park		X				X
Pistol River State Park		X				X
Cape Sebastian State Park		X				X
Rogue National Wild and Scenic River	X			X		X
Wild Rogue Wilderness	X			X		X
Otter Point Wayside		X				X
Geisel Monument State Park		X				X
Humbug Mountain State Park		X				X
Battle Rock Wayside		X				X
Port Orford Heads Wayside		X				X
Garrison Beach Wayside		X				X
Cape Blanco State Park		X		X		X
Floras Lake State Park		X				X

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* Class I air quality area.

continued

Table 12 (continued).

	Ownership/Administration			Special significance		
Name	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
OREGON (cont'd)						
Coquille Myrtle Grove State Park		X		X		X
Camas Mountain Wayside		X				X
Maria C. Jackson State Park		X				X
Hoffman Memorial Wayside		X				X
Bandon State Park		X				X
Bandon Ocean Wayside		X				X
Bullards Beach State Park		X			X	X
Seven Devils Wayside		X				X
Cape Arago State Park		X				X
Shore Acres State Park		X			X	X
Sunset Bay State Park		X				X
South Slough Estuarine Sanctuary	X			X		
Elliott State Forest		X		X		X
Golden and Silver Falls State Park		X		X		X
Millicoma Myrtle Grove State Park		X		X		X
Conde B. McCullough Bridgehead Wayside		X				X
Siuslaw National Forest	X			X		X
William M. Tugman State Park		X				X
Umpqua Lighthouse State Park		X				X
Bolon Island Tideways Wayside		X				X
Umpqua Wayside		X				X
Jessie M. Honeyman Memorial State Park		X		X		X
Darlingtonia Wayside		X		X		X

continued

Table 12 (continued).

Name	Ownership/Administration			Special significance		
	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
OREGON (cont'd)						
Devils Elbow State Park		X				X
Carl G. Washburne Memorial State Park		X		X		X
M. O. Ponsler Memorial Wayside		X				X
Stonefield Beach Wayside		X				X
Neptune State Park		X				X
Yachats Ocean Road Wayside		X				X
Yachats State Park		X				X
Smelt Sands State Park		X				X
Beachside State Park		X				X
Governor Patterson Memorial State Park		X				X
W.B. Nelson State Park		X				X
Driftwood Beach Wayside		X				X
Seal Rock Wayside		X				X
Ona Beach State Park		X				X
Lost Creek State Park		X				X
South Beach State Park		X				X
Yaquina Bay State Park		X			X	X
Agate Beach Wayside		X				X
Beverly Beach State Park		X				X
Devils Punchbowl State Park		X		X		X
Otter Crest Wayside		X				X
Rocky Creek Wayside		X				X
Depoe Bay State Park		X				X

continued

Table 12 (continued).

Name	Ownership/Administration			Special significance		
	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
OREGON (cont'd)						
Boiler Bay Wayside		X				X
Fogarty Creek State Park		X				X
Gleneden Beach Wayside		X				X
D River Wayside		X				X
Devils Lake State Park		X				X
Roads End Wayside		X				X
H.B. Van Duzer Forest Wayside		X		X		X
Neskowin Beach Wayside		X				X
Nestucca Spit State Park		X				X
Cape Kiwanda State Park		X		X		X
Cape Lookout State Park		X		X		X
Oceanside Beach Wayside		X				X
Three Arch Rocks National Wildlife Refuge	X			X		
Cape Meares State Park		X			X	X
Cape Meares National Wildlife Refuge	X			X		
Tillamook State Forest		X		X		X
Rockaway Beach Wayside		X				X
Manhattan Beach Wayside		X				X
Nehalem Bay State Park		X				X
Oswald West State Park		X		X		X
Hug Point State Park		X				X
Arcadia Beach Wayside		X				X
Tolovana Beach Wayside		X				X

continued

Table 12 (continued).

Name	Ownership/Administration			Special significance		
	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
OREGON (cont'd)						
Ecola State Park		X			X	X
Saddle Mountain State Park		X				X
Clatsop State Forest		X		X		X
Del Ray Beach Wayside		X				X
Fort Stevens State Park		X			X	X
Fort Clatsop National Memorial	X				X	
Lewis and Clark National Wildlife Refuge	X			X		
Bradley Wayside		X				X
Sauvie Island Game Management Area		X		X		
Willamette Stone State Park		X				X
Lewis and Clark State Park		X				X
Dabney State Park		X				X
Portland Women's Forum State Park		X				X
Rooster Rock State Park		X				X
Crown Point State Park		X			X	X
Guy W. Talbot State Park		X		X		X
Shepperds Dell State Park		X		X		X
Benson State Park		X				X
Bridal Veil Falls State Park		X		X		X
Ainsworth State Park		X				X
John B. Yeon State Park		X		X		X

continued

Table 12 (continued).

Name	Ownership/Administration Federal	State	Private/ Local	Special significance Natural/ Ecological	Historic/ Cultural	Recreational
OREGON-WASHINGTON						
Columbian White-Tailed Deer National Wildlife Refuge	X			X		
WASHINGTON						
Beacon Rock State Park		X			X	X
Reed Island State Park		X		X		X
Fort Vancouver National Historic Site	X				X	
Vancouver Lake Game Management Area		X		X		
Shillapoo Lake Game Management Area		X		X		
Ridgefield National Wildlife Refuge	X			X		
Paradise Point State Park		X				X
Abernathy National Fish Hatchery	X			X		
Fort Columbia State Park		X			X	X
Fort Canby State Park		X			X	X
Willapa National Wildlife Refuge	X			X		
Loomis Lake State Park		X				X
Pacific Pines State Park		X				X
Leadbetter Point State Park		X				X
Grayland Beach State Park		X				X
Twin Harbors State Park		X				X
Westport Light State Park		X				X

continued

Table 12 (continued).

	Ownership/Administration			Special significance		
Name	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
WASHINGTON (cont'd)						
Westhaven State Park		X				X
Millersylvania State Park		X				X
Capitol State Forest		X		X		X
Lake Sylvia State Park		X				X
Schafer State Park		X				X
Ocean City State Park		X				X
Copalis National Wildlife Refuge	X			X		
Pacific Beach State Park		X				X
Quinault National Fish Hatchery	X			X		
Olympic National Forest	X			X		X
Olympic National Park*	X			X		X
Quillayute Needles National Wildlife Refuge	X			X		
Bogachiel State Park		X				X
Flattery Rocks National Wildlife Refuge	X			X		
Dungeness National Wildlife Refuge	X			X		
Dungeness Spit State Park		X				X
Sequim Bay State Park		X				X
Fort Worden State Park		X			X	X
Rothschild House State Park		X			X	
Old Fort Townsend State Park		X			X	X

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* Class I air quality area.

continued

Table 12 (continued).

Name	Ownership/Administration			Special significance		
	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
WASHINGTON (cont'd)						
Fort Flagler State Park		X			X	X
Mystery Bay State Park		X				X
Anderson Lake State Park		X				X
Kitsap Memorial State Park		X				X
Quilcene National Fish Hatchery	X			X		
Dosewallips State Park		X				X
Pleasant Harbor State Park		X				X
Scenic Beach State Park		X				X
Old Man House State Park		X			X	
Fay Bainbridge State Park		X				X
Fort Ward State Park		X				X
Illahee State Park		X				X
Blake Island State Park		X				X
Lake Cushman State Park		X				X
Lilliwaup Tidelands State Park		X				X
Belfair State Park		X				X
Potlatch State Park		X				X
Twanoh State Park		X				X
Stretch Point State Marine Park		X				X
Deadman's Island State Marine Park		X				X
Kopachuck State Park		X				X
Jarrell Cove State Marine Park		X				X
McMicken Island State Marine Park		X				X
Penrose Point State Park		X				X
Squaxin Island State Marine Park		X				X

continued

Table 12 (continued).

Name	Ownership/Administration			Special significance		
	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
WASHINGTON (cont'd)						
Tolmie State Marine Park		X				X
Eagle Island State Marine Park		X				X
Nisqually National Wildlife Refuge	X			X		
Dash Point State Park		X				X
Flaming Geyser State Park		X				X
Saltwater State Park		X				X
Lake Sammamish State Park		X				X
Klondike Gold Rush National Historical Park	X				X	
Bridle Trails State Park		X				X
Saint Edward State Park		X				X
Mukilteo State Park		X				X
South Whidbey State Park		X				X
Camano Island State Park		X				X
Wenberg State Park		X				X
Fort Casey State Park		X			X	X
Deception Pass State Park		X				X
Bay View State Park		X				X
Saddlebag Island State Marine Park		X				X
Larrabee State Recreation Area		X				X
Mount Baker National Forest	X			X		X
Birch Bay State Park		X				X
Peace Arch State Park		X			X	
Patos Island State Marine Park		X				X
Sucia Island State Marine Park		X				X

continued

Table 12 (concluded).

	Ownership/Administration			Special significance		
Name	Federal	State	Private/ Local	Natural/ Ecological	Historic/ Cultural	Recreational
WASHINGTON (cont'd)						
San Juan Islands National Wildlife Refuge	X			X		
San Juan Wilderness	X			X		
Matia Island State Marine Park		X				X
Clark Island State Marine Park		X				X
Freeman Island State Park		X				X
Rock Island State Park		X				X
Stuart Island State Marine Park		X				X
Danger Rock State Park		X				X
Moran State Park		X				X
Jones Island National Wildlife Refuge	X			X		
Jones Island State Marine Park		X				X
Skull Island State Park		X				X
Doe Island State Marine Park		X				X
Victim Island State Park		X				X
Posey Island State Marine Park		X				X
Unnamed Island State Park		X				X
San Juan Island National Historical Park	X				X	
Blind Island State Marine Park		X				X
Spencer Spit State Park		X				X
Turn Island State Marine Park		X				X
James Island State Marine Park		X				X
Dot Island State Park		X				X

Table 13. Species with special status in the Northwest Pacific Zone.

Map number	Species	Federal		State	
		Endangered	Threatened	Endangered	Rare
	AQUATIC REPTILES AND AMPHIBIANS				
300	Green sea turtle		X		
301	Leatherback sea turtle	X			
	MARINE MAMMALS				
355	Gray whale	X			
357	Right whale	X			
359	Sei whale	X			
360	Finback whale	X			
361	Humpback whale	X			
362	Blue whale	X			
363	Sperm whale	X			
369	Southern sea otter		X		
	TERRESTRIAL INVERTEBRATES				
508	Oregon silverspot butterfly		X		
	BIRDS				
659	Aleutian Canada goose	X			
708	Bald eagle	X	X	CA	
710	American peregrine falcon	X		CA	
761	California brown pelican	X		CA	
	TERRESTRIAL MAMMALS				
921	Columbian white-tailed deer	X			

Species with special status that are known to occur in the Northwest Pacific Zone include two aquatic reptiles, eight marine mammals, one terrestrial invertebrate, four birds, and one terrestrial mammal.

The two turtle species with special status, the green sea turtle (300) and the leatherback sea turtle (301), which occur in the Northwest Pacific Zone, were discussed previously in part 4 of this report.

Seven endangered whale species occur in the offshore waters along the entire Northwest Pacific Zone. As discussed in part 4, all seven may be found as transients in waters along the coastline; gray whales (355) have been known to occasionally enter Puget Sound.

Members of the southern subspecies of the sea otter (369) have been observed as far north as Quillayute Needles National Wildlife Refuge in the Northwest Pacific Zone. Additional information is provided in part 4 of this report.

Oregon silverspot butterfly (508) colonies occur only in salt spray meadows. The most vigorous colony is near Devil's Elbow State Park, Oregon (grid reference DD08); however, other colonies are found along the Oregon and Washington coastline. Adults remain near the larval foodplant and nectar sources. They also will shelter in nearby spruce woods. The major threats to this species are continued residential development and increased recreational use of the critical habitat.

The Aleutian Canada goose (659) breeds in Alaska on Buldir Island of the Aleutian Islands. The birds leave the breeding grounds in late August and arrive in California in October. Although they may be seen in winter throughout the California portion of the Northwest Pacific Zone, the major wintering grounds are in the Southwest Pacific Zone. The birds assemble at their staging areas near Crescent City, California (grid reference CB92 to DB04) between February and March and leave for the Aleutian Islands during late April. Population decline is primarily due to the introduction of Arctic foxes on the Aleutian Islands, although hunting along the migration route is a contributing factor.

The bald eagle (708) occurs year-round throughout the Northwest Pacific Zone and nests north of grid reference DD10. The nest is a massive structure composed of sticks with a deep cup lined with grass and plant stems, usually constructed in a large tree near water. Eggs are laid from mid-February to early April. Pesticide contamination of the food chain, pollution, shooting, and man's development in nesting and feeding areas have all contributed to the decline in numbers of this species.

The American peregrine falcon (710) is considered an extremely sensitive species. To prevent illegal collection of nestlings by falconers and disturbance by birdwatchers or photographers, locations of nest sites were not revealed in this inventory; inquiries regarding locations may be directed to FWS or the appropriate state agencies. This species is not confirmed as nesting in the coastal zone north of Castle Rock (grid reference CB92) but wintering birds may be seen throughout the Northwest Pacific Zone. Nests are normally found on cliff ledges, but may be seen in trees. Nesting usually begins in early March. Although illegal collection, shooting, and disturbance have contributed to the decline of this species, the major decrease appears to have been due to food chain contamination by persistent insecticides.

Post-breeding California brown pelicans (761) are seen along the coast of the entire Northwest Pacific Zone between August and November. Eggshell thinning due to accumulation of persistent insecticides has caused the greatest population reduction; human disturbance and food stress resulting in nest abandonment are also problems.

The Columbian white-tailed deer (921) is found only on several islands in the Columbia River within the Pacific Northwest Zone. Mating begins in November and most births occur in early to mid-June. This species is relatively solitary; average group size is two or three individuals, although herds of up to ten individuals have been seen in winter. They feed on herbaceous vegetation in areas with nearby cover. The conversion of land for agricultural uses has greatly reduced the native grass-forb association the deer depend on, and has been the most important factor in the historical decline of this species. Hunting and elimination of other habitat by beaver-pond drainage also have contributed to the reduction of population size. The deer now seem to be at the carrying capacity of the remaining habitat, which may lead to poor physical condition and increased mortality. The small island populations are also in danger of extinction by chance events such as flooding of the Columbia River.

5.2.2 Aquatic Resources

Many aquatic organisms exist within the area covered by the Northwest Pacific Zone, due in part to the wide variety of habitats present and the relatively low level of disturbance of these habitats by man. Brief life histories of the major commercially, recreationally, and ecologically important aquatic species which occur in this zone are provided below. This summary discusses only those species that were not covered previously in the Resources Overview of the Southwest Pacific Zone (part 4.2).

Plants

Sea lettuce comprises several species and is distributed in many habitats along the shores in the Northwest Pacific Zone. Dense beds of sea lettuce develop in the summer on shallow protected sand or gravel flats with good circulation. Such beds contribute substantial food matter to local benthic assemblages.

Invertebrates

Several invertebrates, previously discussed in part 4 of this report, are of particular interest in the Northwest Pacific Zone. Dungeness crabs are the most important commercial and sport fishing crab in both inshore and offshore waters in the Northwest Pacific Zone; major commercial fisheries exist off of northern California, Oregon, and Washington, and in Puget Sound. Bay shrimp form the basis of a small, commercial shrimp fishery in Puget Sound and blue mussel aquaculture operations are beginning to develop in the same area.

Olympia oysters occur on hard substrates in the lower intertidal zone of estuaries from Baja California to southeastern Alaska. Spawning occurs in water temperatures between 16°C (61°F) and 18°C (64°F) in summer and recruitment peaks at least one and a half months later. The Olympia oyster, although of superior quality, grows slowly and attains a smaller size than the Pacific oyster, the latter of which supports a commercial fishery in Willapa Bay and several parts of Puget Sound.

Weathervane scallops live in shallow depressions in the surface of current-swept subtidal sand, gravel, or shell habitats from Point Reyes, California, to the Aleutian Islands. They generally occur in oceanic waters, which are 20 to 165 meters (66 to 540 feet) deep. Weathervane and some other types of scallops probably spawn in late spring and early summer; recruitment follows a short, free-swimming larval stage. Weathervane scallops support a small and declining commercial fishery in the vicinity of Bellingham, Washington.

The basket cockle lives buried immediately below the surface of intertidal and shallow subtidal sediments, especially silty sand. It most commonly is encountered in quiet bays from Baja California to the Bering Sea. It spawns in the spring after it reaches two years of age; recruitment is probably greatest in midsummer. Although a desirable species for sport diggers, the cockle generally is not sufficiently common for commercial harvest.

Butter clams live buried at least 20 centimeters (8 inches) below the surface of intertidal and shallow subtidal sediments, especially mixed silty sand and gravel, in the Northwest Pacific Zone. They are most common in semiprotected bays or subtidal areas with moderate currents. Spawning occurs from spring to late summer. Butter clams are commercially important in Washington and together with common littleneck clams, which were discussed in part 4, are especially important in Puget Sound. Two bivalves discussed in part 4, the gaper and the razor clam, support small commercial fisheries in Washington. All four clams are important sport fishing species and may be harvested from November through March along the coast and year-round in Puget Sound.

Only three abalones are found in the Northwest Pacific Zone: the red abalone occurs as far north as Sunset Bay, Oregon; the black abalone occurs as far north as Coos Bay, Oregon; and the flat abalone occurs along the entire Northwest Pacific Zone coast. Red abalones and black abalones were discussed in part 4 of this report; the flat abalone occurs from La Jolla, California, to British Columbia, but is rare south of Carmel, California. The flat abalone is found subtidally to depths of 21 meters (70 feet) in areas with rocky substrates. It is generally not plentiful, but locally may be abundant. Abalone are an important resource for both commercial and sport fisheries in California.

Ocean pink shrimp are most common on offshore green mud sediments at depths between 45 and 365 meters (150 and 1,200 feet) from San Diego, California, to the Aleutian Islands. Although also found in Puget Sound, they appear restricted to deepwater areas with high salinities. Ocean pink shrimp feed on planktonic euphausiids and copepods at night during diel migrations and on benthic organisms and detritus during the day while resting on the bottom. Females with eggs are most abundant between October and March. The planktonic larval stage lasts two to three months, usually during the spring. Adult pandalid shrimp, such as the ocean pink shrimp, are typically male during their first year and a half, and then become female for the remainder of their two to four years. Ocean pink shrimp are the basis for an important commercial trawl fishery off the coasts of northern California, Oregon, and Washington.

Spot prawns (shrimp) are encountered most commonly on subtidal rock or mud slopes or in subtidal rocky areas between depths of 30 and 525 meters (98 and 1,723 feet) from San Diego, California, to the Aleutian Islands. They frequently occur in deep bays or submarine canyons. Adults generally are found in areas where water quality approaches ocean conditions, but considering their broad geographic range and diel migratory patterns, they apparently have a broad temperature tolerance. Females with eggs are most common from December through April. Eggs hatch in early spring and larvae are planktonic in deep water for two to three months before settling as postlarvae in water 8 to 120 meters (26 to 394 feet) deep; the shrimp then migrate to deeper water as they grow. They mature as males in their second year and become females in their third or fourth year. Spot prawns are the largest pandalid shrimp in the Northwest Pacific Zone and form the basis of a small, commercial, pot shrimp fishery in the inland marine waters of northwest Washington.

The common inshore squid is a demersal species found in both nearshore and offshore waters, especially over soft, sloping substrates, from Baja California to British Columbia. Spawning occurs in July and August in the Northwest Pacific Zone.

The giant octopus occurs mainly on rough, rocky subtidal habitat from Baja California to the Aleutian Islands. It lives in deep estuarine waters such as Puget Sound as well as along exposed coasts. It generally requires high water quality and can tolerate salinity down to 27.6 parts per thousand. Spawning mainly occurs from January through July and the females brood the eggs. Peak hatching probably occurs in early spring; females probably die during or following brooding. Octopus are commercially caught for food and bait in northern California and the Strait of Juan de Fuca.

Crayfish are found in streams, sloughs, and lakes throughout the Northwest Pacific Zone. Copulation occurs in the fall in freshwater and fertilization of eggs occurs in spring to early summer. Females carry the eggs from 2 to 20 weeks before the eggs hatch. Adults are benthic, inhabiting burrows or small depressions during the day and foraging at night. Crayfish are taken by both sport and commercial fishermen in areas of local abundance.

Amphipods are widely distributed in bays, estuaries, and inlets along the entire U.S. Pacific coast. They are an important component of the epibenthic and benthic communities and are prey items for a wide variety of fish having sport and commercial importance. Amphipods are usually present year-round though population numbers peak at different times of the year along the coast.

Piddocks are a group of bivalves that burrow into rock and hard clay substrates in both exposed and protected areas along the entire U.S. Pacific coast. Piddocks are popular in some locations as sport species; they are of no commercial value.

The mud shrimp occurs in bays and estuaries at the lower tide levels from Baja California to southeast Alaska. It lives in burrows that extend 46 centimeters (18 inches) below the surface and run for 0.5 to 1.5 meters (2 to 5 feet) before surfacing. Spawning occurs in the winter and females carry the eggs for several weeks until hatching. Mud shrimp are sought for the live bait market, but have little or no value as human food.

Fish

Commercially important fish in the Northwest Pacific Zone include many salmonids and flatfishes, lingcod, Pacific herring, eulachon, white sturgeon, Pacific cod, and Pacific ocean perch. Important sport fish include some of the above species plus American shad, cabezon, Dolly Varden, steelhead, rainbow trout, and cutthroat trout.

a. Freshwater species. The mountain whitefish occurs in mountain lakes and streams from central California to the United States-Canada border. Spawning usually occurs in the fall, with eggs hatching the following spring. Mountain whitefish are a minor sport species in areas of local abundance.

The rainbow trout is distributed in lakes, rivers, and streams throughout the colder waters of the northern hemisphere. Rainbow trout are the resident, freshwater form of the anadromous steelhead and spend their entire lives in freshwater. Spawning usually occurs in the fall, and eggs overwinter until spring, when hatching occurs. In addition to being present as wild stocks, rainbow trout are produced by intensive hatchery cultivation; they are a very important sport species throughout the Northwest Pacific Zone.

The Olympic mudminnow is a small, freshwater species endemic to the Olympic Peninsula of Washington and a few nearby river systems. Mudminnows commonly inhabit swamps, muddy streams, and sloughs. They have the ability to bury themselves in mud to withstand drought or freezing conditions. Little information on their life history is available. The Olympic mudminnow is of scientific interest as the last remaining representative of an ancient fauna that formerly covered the North American continent.

b. Anadromous species. The chum salmon is distributed from northern California to the Bering Sea. Chum salmon reach maturity at three to five years and enter rivers on spawning runs from October to December. Adults die after spawning. Young hatch in spring and move immediately to the sea. Three to four months are spent in nearshore areas (estuaries and bays) before the young gradually move to deeper water with increasing size. Chum salmon are bottom oriented as juveniles and returning adults and are pelagic while at sea. Nearshore areas occupied by juveniles are critical habitats; research has shown that most mortalities occur during this three to four month period. Chum salmon are important sport and commercial species; the fishing season is generally from midsummer through October.

The pink salmon is distributed from southern California to the Arctic Ocean. Washington State is the southern limit of the pink salmon's spawning range. Adults enter large, cold rivers from August to October to spawn, dying after spawning. Fry move to sea immediately after hatching in the early spring. Young pink salmon travel in schools and stay in nearshore areas (estuaries and bays) until summer. The saltwater stage lasts about one year during which they may migrate up to 800 kilometers (500 miles) offshore. As with chum salmon, highest mortalities occur during the three- to four-month period spent in nearshore areas. Pink salmon are bottom oriented as young fish and as returning adults and pelagic while at sea. Pink salmon are important as a commercial and sport species; the salmon fishing season is generally from midsummer through October.

The sockeye salmon is distributed from the Columbia River to Alaska. Adults enter spawning streams with inland lakes from June to August, making long migrations upstream to and through the lakes. Adults die after spawning. After hatching, some of the young move to the sea immediately, while others remain in freshwater lakes for one to two years, using the lakes as a nursery area. Most young reach the ocean during the summer and remain in nearshore areas for a short time before moving out to sea. Migrations while at sea are extensive. Sockeye salmon are bottom oriented as juveniles and returning adults and pelagic while at sea. Sockeye salmon are important as both sport and commercial species in areas of local abundance; the fishing season is generally the same as that for chum and pink salmon.

The Dolly Varden is distributed from northern California to Alaska. Both anadromous and freshwater populations exist. Adults enter streams to spawn during the fall. In anadromous populations, the young spend about three years in a freshwater environment before moving to the ocean; the oceanic stage can last from two to three years. Dolly Varden are an important sport species.

The river lamprey is distributed from San Francisco Bay to southeast Alaska along the Northwest Pacific Zone. Little information is available concerning its freshwater phase; young may spend several years in their parent stream before moving to sea. Like the Pacific lamprey, the river lamprey is important chiefly because of the damage it does to commercial and sport fish species, especially young salmon.

The cutthroat trout is distributed from northern California to Alaska. Spawning occurs in late winter to early spring; adults do not die after spawning. After hatching, young remain in their local stream for two to five years, then move downstream to the marine environment. Cutthroat may remain in estuarine areas for a short period, and form schools before migrating to the open ocean. Movements at sea are not extensive and cutthroat usually remain within 130 to 160 kilometers (80 to 100 miles) of the parent stream. Cutthroat trout are an important sport species; fish from both wild stocks and hatchery cultivation make up the sport catch.

c. Estuarine-dependent species. Estuaries are important as breeding, nursery, and feeding areas for many fish. All salmonids, numerous flatfish, and sturgeon are dependent on estuaries during some phase of their life history.

The sand sole is distributed from southern California to the Bering Sea and is a shallow water inhabitant never recorded from deeper than 183 meters (600 feet). Spawning occurs in late winter to early spring; the eggs drift in the water column and pelagic larvae hatch in a few days. Some reports indicate that the first year of life is spent in bays and estuaries. Sand sole tolerates several bottom types including silt and fine sand. The sand sole is taken as a sport species along most of the Northwest Pacific Zone.

d. Oceanic species. The butter sole is distributed from southern California to southeast Alaska. It is commonly taken in shallow, coastal waters. Spawning occurs in the spring; the eggs sink, and soon a free-swimming larvae hatches. Young butter sole remain inshore and slowly move to deeper water as they grow older. Butter sole is a minor commercial species along the Northwest Pacific Zone.

The Dover sole is distributed from northern Baja California to the Bering Sea in shallow waters and to depths of 900 meters (3,000 feet). Spawning occurs from winter to early spring and the pelagic larvae have an extended free-swimming period of one to several months. During this period the larvae may drift with the ocean currents for considerable distances. Young eventually settle and metamorphose in shallow waters and gradually move deeper with age. Migratory movements are not extensive, however the fish are observed to move inshore in the summer months and back offshore in the winter months. Adults favor soft bottoms; mud and fine sand is typical. Dover sole is a highly valued commercial species, both for its flavor and keeping ability. It is an incidental component of the sport fishermen's catch.

The rock sole is distributed from southern California to the Bering Sea. It occurs from shallow water to 365 meters (1,200 feet), but most commonly is caught in less than 180 meters (600 feet) of water. Spawning occurs in offshore waters, at least as far south as Oregon in the Northwest Pacific Zone, from February to April. The eggs sink and the free-swimming larvae, which hatch in 9 to 18 days, are found in shallow waters around beaches. Juveniles frequent depths of 9 to 15 meters (30 to 48 feet). Rock sole moves from deeper waters in winter to shallower waters in summer. Rock sole prefers rapidly sloping pebbly or mixed sand and pebble bottoms. One of the smaller species of flatfish, the rock sole is a highly regarded food fish, but is only of minor importance to commercial and sport fisheries.

The rex sole is distributed from southern California to the Bering Sea and is most abundant in water deeper than 365 meters (1,200 feet). Its life history is poorly understood and probably takes place mostly in offshore waters since young are rarely seen in nearshore areas. Rex sole is in high demand as a food fish and is caught year-round; the areas of greatest commercial importance are near bays along the California-Oregon coast.

The petrale sole is distributed from northern Baja California to the Gulf of Alaska. Spawning may occur from November to April in deep water. The eggs drift with ocean currents and sink before they reach nearshore areas; the hatched larvae are pelagic and show a preference for shallower habitats, gradually moving offshore with age. An offshore spawning migration occurs in winter and is followed by an inshore migration in summer. Petrale sole are a valuable commercial groundfish species and generally are taken by offshore trawling; few are taken by sport fishermen.

The Pacific halibut is distributed from southern California to the Bering Sea along the U.S. Pacific coast. It is a benthic species recorded to depths of 1,100 meters (3,600 feet). Halibut spawn in the winter months in water

275 to 410 meters (900 to 1,350 feet) deep; spawning migrations of up to 1,600 kilometers (1,000 miles) have been recorded. Both eggs and larvae are pelagic for four to five months; the larval fish are carried nearshore by spring and summer surface currents where they settle to the bottom. With increasing age the young fish move offshore. Halibut are a highly sought commercial and sport species. Commercial fishing usually occurs June through September on offshore banks ranging from 18 to 275 meters (60 to 900 feet) in depth.

The arrowtooth flounder is a deepwater species distributed from central California to the eastern Bering Sea along the U.S. Pacific coast. Spawning occurs in the winter months and both eggs and larvae are carried by currents. Young fish are restricted to shallow waters from spring into summer and gradually move deeper as they age. Arrowtooth flounder are a minor commercial and sport species in the Northwest Pacific Zone.

The Pacific cod is distributed from southern California to the Bering Sea along the U.S. Pacific coast from the surface to 550 meters (1,800 feet). Spawning occurs during the winter months; it is known to move to deep water in autumn prior to spawning and return to shallow water in spring. Pacific cod uses both open water and benthic habitats during its life history. It is a schooling fish usually found over smooth, firm bottoms in at least 24 meters (78 feet) of water. Pacific cod is an important year-round commercial and sport species in the Northwest Pacific Zone.

The Pacific ocean perch is distributed from southern California to the Bering Sea at surface to 640-meter (2,100-foot) depths, but is most common beyond 128 meters (420 feet). It is not a true perch, but a member of the rockfish family. Spawning occurs in summer, possibly within the three-mile limit. Young are born live and spend two to three years in a pelagic phase; migration during this phase can be extensive. The benthic adults are usually associated with firm bottoms containing ledges, submarine canyons, or rocky outcroppings. This is a major, year-round commercial species and ranks first in rockfish landings in the Northwest Pacific Zone.

The Pacific hake is distributed from the Gulf of California to the Gulf of Alaska in surface waters to 900 meters (295 feet). Spawning may occur from late winter to summer in offshore waters. Both eggs and larvae are pelagic. Feeding occurs primarily between twilight and darkness when schools of hake rise vertically in the water column. Hake is presently not important either as a commercial or sport species. Offshore concentrations are large however, and they may be a resource of considerable value in the future.

Reptiles and Amphibians

Only two aquatic reptile and amphibian species are mapped within the Northwest Pacific Zone. Both of these species are species with special status, which were discussed in part 4 of this report.

Mammals

A wide variety of mammals occur within the Northwest Pacific Zone. Some are year-round residents while others migrate through the coastal waters. All mapped marine mammals are protected by the Marine Mammal Protection Act of 1972.

The striped dolphin is widely distributed in temperate and tropical waters and occurs along the U.S. Pacific coast from just south of the Columbia River to the Bering Sea. Little information is known concerning its breeding biology.

Along the U.S. Pacific coast, the pygmy sperm whale ranges northward to Washington State, preferring warmer waters. It travels singly or in small pods well offshore, from the continental slope seaward; usually, it is seen only when infrequent strandings occur.

The harbor porpoise is found from Baja California to the Arctic Ocean along the U.S. Pacific coast. This small porpoise avoids humans and is rarely observed even though it inhabits estuaries, harbors, and bays.

The northern subspecies of the sea otter is not on the Federal threatened or endangered list. A small number of northern sea otters occur along the Oregon and Washington coast as the result of a transplant from the stable population in the Aleutian Islands. Sea otters are often seen floating on their backs among kelp blades while eating. Mating activities can occur throughout the year, but young most commonly are born in the spring. Recent aerial surveys in Oregon and Washington have failed to account for all of the transplanted northern sea otters.

5.2.3 Terrestrial Resources

The Northwest Pacific Zone is rich in terrestrial resources, although development and increasing urbanization are causing a decline in the population size of many species. The numerous offshore rocks, islets, and islands are very important shorebird and seabird breeding areas. Vast expanses of richly vegetated and minimally disturbed mainland are inhabited by a large variety of terrestrial animals, many of which are disappearing from more disturbed areas.

Plants

Due to the absence of official state lists of rare, threatened, or endangered plants in Oregon and Washington and the lack of species on Federal lists in this zone, only large areas of coniferous forest were mapped. The Natural Heritage Program of the Nature Conservancy in both Oregon and Washington should be consulted for site specific information on plant species of concern in these two states.

Invertebrates

The Oregon silverspot butterfly, a species with special status, is the only terrestrial invertebrate mapped in this zone (see part 5.2.1).

Birds

Coastal wetlands, lakes, coastal bays, freshwater marshes, forests, and offshore islands, islets, and rocks all occur in the Northwest Pacific Zone. Within these habitats, birds are one of the more conspicuous and important terrestrial groups. The large avian population of the region consists of shorebirds, wading birds, waterfowl, raptors, seabirds, and songbirds and others.

Areas mapped for bird species were selected based on the area's importance to the species within the geographic interval. Thus, no absolute population cutoff points were used throughout the inventory. The selection of mapped areas was based on published information and conversations with knowledgeable individuals concerning areas and species of importance.

a. Shorebirds. Shorebirds, including gulls, terns, sandpipers, phalaropes, plovers, and turnstones, are found near shore and intertidal areas. Some species are found in the Northwest Pacific Zone throughout the year and some are winter visitors or fall and spring transients. Others winter to the south and return to nest from March to May. Egg laying and hatching are usually completed by late June or early July, and the birds return to the south from late August through October.

Snowy plovers breed on undisturbed beaches, in nests built in open areas of sand and mud, along the coastline of the Northwest Pacific Zone as far north as Grays Harbor, Washington. The breeding season begins in early May. The snowy plover is considered a species of special concern because suitable undisturbed beach habitat is decreasing.

b. Wading birds. Wading birds, including herons, egrets, bitterns, and rails, are found in both freshwater and saltwater marsh areas of the coastal zone. Most species are resident and breed during the spring and summer.

c. Waterfowl. Loons, grebes, swans, geese, and ducks make up the waterfowl category. Dabbling ducks are surface-feeders commonly found in freshwater and saltwater marshes; they include mallards, pintail, and teal. Diving ducks, or bay ducks, dive from the surface and feed underwater. They are found most often in coastal bays and river mouths, and include canvasbacks, scaups, and goldeneyes. Sea ducks are usually seen along the coast or at sea, and include oldsquaws, scoters, and eiders. The three North American species of mergansers are fish-eating ducks with a long, thin, serrated bill. Most waterfowl species are winter visitors to the Northwest Pacific Zone, although some, such as mallards, are residents and may breed in the zone. Waterfowl are important as aesthetic, recreational, and economic resources.

d. Raptors. Raptors include vultures, hawks, falcons, eagles, and owls. Owls are generally residents of wooded areas, although several species are found in coastal areas or open fields and meadows. Many hawks, vultures, eagles, and falcons are residents, although some are winter visitors.

Ospreys have declined in number in the Northwest Pacific Zone due to habitat loss, pesticides, and human disturbance. Nests usually are built in spring in dead snags standing in or near streams or lakes. The spotted owl prefers old growth timber in coniferous forests. This habitat type is declining in the zone and the owls are considered a species of special concern.

e. Seabirds. Seabirds include albatrosses, shearwaters, storm petrels, cormorants, and alcids. Most are pelagic species, normally coming to land only to breed. Many of the mapped species, such as cormorants, nest within the coastal zone; a few, such as albatrosses, are perennial visitors or transients. Although courtship may begin as early as March, nesting usually does not occur until May or June. Offshore islands, islets, rocks, and coastal cliffs are the major breeding areas for this group.

f. Songbirds and others. This category includes all of the passerines (perching birds) and a variety of other birds such as woodpeckers, doves, and grouse. Some species are important as recreational and economic resources, especially the gallinaceous species such as quail and grouse. Others are aesthetically and recreationally important and are sought out by birdwatchers and photographers. Many species, such as grouse and woodpeckers, are resident, breeding in the spring and early summer. Many other species, such as bluebirds, pass through the Northwest Pacific Zone as they migrate along the Pacific Flyway; these are generally fall and spring transients or visitors during summer or winter.

Reptiles and Amphibians

Although a variety of reptiles and amphibians is found within the Northwest Pacific Zone, only one species, the Pacific giant salamander, is currently considered of special concern. It is usually found in damp forests near clear, cold streams throughout the zone. Numbers are declining due to development, pollution, and overcollection by amphibian enthusiasts.

Mammals

Important mammals of the Northwest Pacific Zone include mule deer, gray foxes, bobcats, mountain lions, raccoons, and black bears. Most of the mammalian species are more likely to be found in the less developed areas within the region, but some species are indifferent to or actively seek out urbanized areas. Although a few species form large groups or herds, most are found in pairs or small family groups.

Mule deer is one of the more important big game species in the Northwest Pacific Zone. Although three subspecies of mule deer are found within the entire Pacific coast region, the black-tailed deer is the subspecies found within the Northwest Pacific Zone and is the designation used in the States of Oregon and Washington; for consistency with the Southwest Pacific Zone, the designation "mule deer" was used in the State of California. Individuals and small groups may be seen throughout the region, but larger groups tend to concentrate in protected areas such as state parks.

Black bears and elk, both big game species, are also found throughout the undeveloped areas of the zone. Adult male bears tend to be solitary except during the mating season, mainly from mid-June to mid-July; females may be solitary, but often are seen with cubs. Elk normally travel in small herds consisting of one adult male, several females, and calves. In addition to hunting, all of these large mammals are important aesthetic resources.

5.3 PACIFIC NORTHWEST COAST EXCLUDING THE COLUMBIA RIVER ESTUARY (Grid Reference CV87 to CJ76)

The coastal area of the Pacific Northwest Coast section, from Cape Mendocino in California to Cape Flattery in Washington, consists of sandy beaches alternating with rocky headlands. The coastline generally lies in a fairly straight, north-south orientation. The majority of the coastline is exposed, open coast subject to the full force of the ocean. General seasonal wind directions cause a southward offshore surface current in summer and a northward current in winter. Upwelling of deep, colder water loaded with nutrients is substantial in the southern half of this section, but less important in the northern half. The life histories of nearshore and offshore species are closely related to the occurrence of upwelling. Plant and animal communities throughout this section are generally similar, with no major differences from south to north. The biotic resources for this section are keyed geographically using west-east UTM grid swaths.

5.3.1 Aquatic Resources

Coastal upwelling of nutrients onto segments of the relatively narrow continental shelf of this section provides the basis for the support of many fish species of commercial and recreational value. The numerous estuarine regions in this section support large stocks of shellfish and finfish resources that are important commercially and recreationally. The coastline of this section is also a migratory corridor for several marine mammals.

Widespread Species

Rocky areas within the three-mile limit have large kelp beds that provide habitat for many finfish species. Laminarians and feather boa kelp are quite common in low intertidal rocky habitats. Several of the coastal estuaries and lagoons contain significant eelgrass beds.

Many shellfish species of economic importance can be found in this section. Open-coast sandy beaches frequently contain razor clams and many beaches contain large enough stocks to support commercial harvesting as well as recreational digging. The bays and estuaries contain stocks of scallops, basket cockles, butter clams, gaper clams, soft-shelled clams, common littleneck clams, and geoduck clams. Crab species are widespread and dungeness crabs are an important commercial and recreational species.

Salmonid species are by far the most important commercial and recreational fish species caught in this section. Salmon are widespread along the coast and major fishing areas occur seaward of the mouths of estuaries and rivers emptying into the ocean. Most sport salmon fishing on the open coast occurs during the summer and early fall. Steelhead trout are recreationally fished in winter in most rivers in this section. Catfish and sunfish, including bass, bluegill, and white and black crappie, are recreational species generally found in all warm water lakes in the Pacific Northwest Coast section. Numerous bottom fish, including rockfish, flatfish, and cod, occur throughout this section and enter into the commercial and recreational catch year-round; most sport fishing for these species occurs near the mouths of bays and estuaries. Offshore, schools of albacore tuna are seasonal visitors to this section and support a recreational fishing effort when present. Various bass and perch species, sharks, rays, smelts, sculpins, and eels are distributed throughout this section. Some of these species, such as bass and perch, are sought after as sport fish while others form an incidental part of sport and commercial catches.

California sea lions, Steller sea lions, and harbor seals are distributed along the coast and often are seen frequenting offshore islands and rocks. Though seasonally present only during migratory periods, the gray whale is the most commonly encountered whale species in nearshore waters along the coast of this section.

Geographic Inventory

Between Cape Mendocino and the Oregon border (grid reference CV87 to CB94) smelt spawn on the sandy beaches. In addition, nine major rivers and creeks serve as routes of anadromous fish, including chinook and coho salmon, steelhead, Pacific lamprey, green and white sturgeon, American shad, striped bass, and cutthroat trout.

The Bear River (grid reference CV88) is the first of the nine anadromous fish rivers of importance encountered moving north along the coast from Cape Mendocino. It is especially noted for coho salmon and steelhead trout.

Between grid reference CV89 and DA02, dungeness crabs are harvested commercially all along the coast. The Eel River (grid reference CA90 to DV17) is an important river for anadromous fish; at the mouth of the river is a year-round haulout area for harbor seals.

Humboldt Bay (grid reference CA90 to DA02), is fed by two more of the nine anadromous fish runs: the Elk River (grid reference DA00) and Jacoby Creek (grid reference DA12). Humboldt Bay contains significant eelgrass beds which harbor numerous commercially and recreationally important shellfish and finfish. Harbor seal rookeries also are located in the bay. In the north bay surfperches are taken year-round by shore fishermen. Salmon are fished for sport off the entrance to Humboldt Bay (grid reference CA91) in the spring and razor clams are taken for sport on the sandy beaches between grid reference CA90 and DA04.

The Mad River (grid reference DA03) is another of the anadromous fish runs of the northern California coast. Important species in this river include chinook and coho salmon in summer and fall, steelhead trout in winter, and eulachon in spring.

The Little River, another anadromous fish stream, enters the ocean in grid reference DA04. Also in grid reference DA04, rocks off of Trinidad Head are important haulout areas for California sea lions, Steller sea lions, harbor seals, and northern elephant seals. Rockfish and lingcod are fished for sport off of this point of land.

Prairie Creek (grid reference DA07), and its feeder Redwood Creek, provide another anadromous fish spawning run. Offshore at grid reference DA07, Redding Rock is an important haulout area for California sea lions and harbor seals.

The Klamath River (grid reference DA09) is a significant anadromous fish stream for chinook and coho salmon, steelhead, white and green sturgeon, American shad, and eulachon. At the mouth of the Klamath River and just up the coast at False Klamath Rock (grid reference DB00) are important California sea lion and harbor seal haulout areas.

Castle Rock (grid reference CB92) is another haulout area for California sea lions and harbor seals. In nearby waters, sport fishermen seek rockfish, Pacific halibut, lingcod, and cabezon.

The Smith River (grid reference DB04) is the last major anadromous fish stream in northern California before the California-Oregon border. Chinook and coho salmon, steelhead, green sturgeon, American shad, and eulachon are fished for sport.

Near the mouth of the Chetco River (grid reference CB95) are important shellfish areas, and sport fishing grounds for salmonids, flatfish, and rockfish.

Rogue River Reef (grid reference CC70) hosts important Steller sea lion and California sea lion rookeries.

The Elk River (grid reference CC73) is one of the primary fall chinook salmon streams in Oregon. Southern sea otters have been introduced along the coast in this area and flat abalone occur here. Offshore, at Orford Reef (grid reference CC63), are important Steller sea lion and California sea lion rookeries.

A small number of transplanted northern sea otters use the reefs near Cape Blanco (grid reference CC74) as haulout areas.

Significant commercial and sport fishing for American shad occurs between the Coquille River estuary and the Siuslaw River (grid reference CC87 to DD07). Cape Arago (grid reference CC89) hosts an important California sea lion rookery and a small number of transplanted northern and southern sea otters use nearby reefs as haulout areas. This is also the northernmost extent of the occurrence of red abalone.

Coos Bay (grid reference CD90 to DD00) contains significant eelgrass beds and a wealth of invertebrates, including butter clams, gaper clams, soft-shelled clams, common littleneck clams, ghost shrimp, and dungeness crabs. The south slough of Coos Bay (grid reference CC99) is a state designated estuarine sanctuary, also rich in eelgrass beds and invertebrates such as crabs, mussels, and clams. Coos Bay marks the northernmost extent of the occurrence of black abalone along the coast.

Alsea and Yaquina Bays (grid reference DE12 and DE14) contain significant eelgrass beds and a large number of shellfish and finfish. Commercial oyster culturing occurs in Yaquina Bay and an important sport fishery for chinook and coho salmon exists in summer and fall at the mouth of this bay.

Tillamook Bay (grid reference DF23 to DF24) contains significant eelgrass beds and some sea lettuce. It is an important area for the commercial culture of Pacific oysters, as well as being home to several clam species.

Willapa Bay (grid reference DG23 to DG17) and Grays Harbor (grid reference DG19 to DH10) both contain significant eelgrass beds and other seagrasses. Dungeness crabs are harvested both commercially and for sport in Willapa Bay. A commercial clam harvest and commercial culturing of Pacific oysters occur year-round in both bays. There are several harbor seal haulout areas in Willapa Bay. Chinook and coho salmon are taken for sport at the mouth of Grays Harbor in summer and fall. Both Willapa Bay and Grays Harbor are important nursery areas for juvenile salmonids, flatfish, rockfish, and cod.

A small population of southern sea otters exists off of Destruction Island (grid reference CH88).

Northern sea otters, which were transplanted from Amchitka Island, Alaska, are found off of Cape Alava (grid reference CJ73) where they utilize the rocks as a nursery area.

5.3.2 Terrestrial Resources

Widespread Species

Much of the Pacific Northwest Coast section is covered by coniferous forests composed primarily of Douglas fir. These forested uplands are highly valuable timber resources and support substantial commercial operations throughout the section.

The Pacific Northwest Coast section is significant for providing resting and feeding habitat for migratory shorebirds and waterfowl using the Pacific Flyway. Common species along the coastline include: gulls, terns, sandpipers, loons, grebes, brants, Canada geese, American wigeons, pintails, mallards, canvasbacks, and swans. Many areas are important for sport hunting.

Numerous raptors, including hawks and owls, can be found in the forested areas of the Pacific Northwest Coast section. Both the endangered American peregrine falcon and the bald eagle occur in this section. No nest sites for the American peregrine falcon have been mapped and it is assumed that the coastline of this section is a migratory corridor and overwintering area. The bald eagle nests over much of the Pacific Northwest Coast section and uses the river valleys as winter range; known nest sites are identified on the inventory maps.

Offshore rocks and islands from Cape Mendocino to Cape Flattery are used as nesting areas by a wide variety of seabirds and shorebirds. Species nesting on these islands include gulls, cormorants, storm petrels, and alcids. Many of these areas have been designated as national wildlife refuges.

Common terrestrial mammals of this section include rabbits and hares, squirrels, beavers, raccoons, and black-tailed deer. The drainages immediately adjacent to many of the estuaries in this section provide overwintering range for several big game species hunted for sport, including black bear, elk, and black-tailed deer.

Geographic Inventory

Bald eagle overwintering and Aleutian Canada goose spring staging areas are concentrated around the Eel River delta and Humboldt Bay between grid reference CV89 and DA02. American peregrine falcons and California brown pelicans may be seen here. This is also an important resting, feeding, and overwintering area for many migratory shorebirds and waterfowl, including loons, grebes, brants, geese, American wigeons, pintails, mallards, and canvasbacks. Mountain beavers may be found within 3 kilometers (2 miles) of the coastline north of the Eel River toward Humboldt Bay.

The rocks off of Trinidad Head (grid reference DA04 to DA05) provide important spring and summer nesting areas for black oystercatchers, western gulls, fork-tailed storm petrels, Leach's storm petrels, Brandt's cormorants, pelagic cormorants, common murres, pigeon guillemots, Cassin's auklets, rhinoceros auklets, and tufted puffins.

The Prairie Creek-Redwood Creek watershed (grid reference DA04 to DA18) supports a large concentration of elk. Bald eagles overwinter along these creeks, also.

Castle Rock (grid reference CB92) marks the northernmost extent of American peregrine falcon nesting along the California coast. Castle Rock, Lake Earl in the vicinity of grid reference DB03, and the mouth of the Smith River at grid reference DB04 support concentrations of migrating Aleutian Canada geese in winter and early spring. Castle Rock also supports colonies of nesting shorebirds and seabirds in spring and summer, and California brown pelicans may be seen in the area. Lake Earl supports resident herons and egrets, and fall and winter populations of migrating waterfowl. In addition to migrating waterfowl, snowy plover nests may be found in spring at the mouth of the Smith River. Mountain beavers occur within a 3-kilometer (2-mile) wide band of coastline north and south of the Smith River between grid reference DB04 and DB05.

The Chetco and Rogue River estuaries (grid reference CB95 and CB89) are concentration areas for migratory shorebirds and waterfowl; the California brown pelican also congregates in the fall in these areas. The Chetco and Rogue River watersheds provide nest sites for spotted owls. Rocks, islets, and islands off the coast between the two rivers provide nesting areas for gulls, cormorants, storm petrels, murres, auklets, and puffins. Just south of Pistol River State Park (grid reference CB88) is a concentration area for migrating Aleutian Canada geese.

Snowy plovers breed along the coastline at grid reference CC81 and CC75.

A concentration of spotted owl nests occurs in summer in the vicinity of grid reference DC45; spotted owls are year-round residents in the area.

The Coquille River watershed (grid reference CC89) contains the largest herd of Roosevelt elk in Oregon and provides an important feeding, resting, and overwintering area for migratory shorebirds and waterfowl, including swans, geese, American wigeons, pintails, mallards, and canvasbacks. Transient California brown pelicans may be seen near the mouth of the river.

Coos Bay (grid reference CD90) is an important area for migratory shorebirds and waterfowl and a concentration area for egrets, great blue herons, cormorants, common murres, and pigeon guillemots. The American peregrine falcon is known to migrate through and overwinter in the Pacific Northwest Coast section, and the North Spit of Coos Bay is an area of consistent falcon sightings. The North Spit is also an area of snowy plover and great blue heron nesting.

Extensive uplands in the Umpqua River watershed (grid reference DD03 to DD04) serve as winter range for black bears, mountain lions, elk, and black-tailed deer. A large concentration of snowy plovers breed along the coast.

Siltcoos Lake (grid reference DD15) is an important overwintering and feeding area for bald eagles and ospreys.

Snowy plovers nest along the coast north of the Siuslaw River (grid reference DD07). Inland areas along the river provide locations for spotted owl and bald eagle nesting in spring and summer.

A portion of the shoreline at grid reference DD19 is designated as critical habitat for the Oregon silverspot butterfly.

Alsea Bay (grid reference DE12) harbors concentrations of bald eagles in winter, California brown pelicans in fall, great blue herons and seabirds year-round, and numerous spring and fall migrating shorebirds and waterfowl. Nearby upland areas support bald eagle and spotted owl nesting and overwintering areas for elk and black-tailed deer.

Upland areas near Yaquina Bay (grid reference DE14) serve as winter ranges for black bears, mountain lions, elk, and black-tailed deer and as nesting areas for bald eagles. The bay is an overwintering area for migrating shorebirds and waterfowl. Snowy plovers nest along the coast.

Several bald eagle and snowy plover nesting sites occur near the mouths of the Salmon River and Neskowin Creek (grid reference DE28 to DE29). Nestucca Bay (grid reference DF20) harbors additional snowy plover nesting. Inland areas along the Nestucca River (grid reference DF40 and DF51) contain Oregon silverspot butterflies and bald eagle and spotted owl nest sites.

Cape Lookout and Netarts Bay (grid reference DF22) provide nesting areas for snowy plovers and great blue herons, stopover areas for migrating California brown pelicans and numerous shorebirds and waterfowl, and concentration areas for hawks and passerines.

Tillamook Bay (grid reference DF24) is the most important black brant wintering area in Oregon. It is also an overwintering area for sandpipers, phalaropes, terns, plovers, great blue herons, dabbling and diving ducks, swans, and several raptors. Bald eagles nest in the area in spring.

Willapa Bay National Wildlife Refuge is one of the most important areas for avian species in the Pacific Northwest Coast section. It is the most important black brant wintering area in the State of Washington; many other migrating shorebirds and waterfowl overwinter and nest in the bay. Bald eagles and other raptors nest in the area; Willapa Bay is an area of consistent sightings of American peregrine falcons and spotted owls overwinter here, although neither is known to nest in the area. Herons, egrets, bitterns, and rails are found here as are quail, grouse, pheasants, doves, woodpeckers, passerines, flycatchers, bluebirds, and warblers.

Grays Harbor (grid reference DG19) is an area of concentration for California brown pelicans, nesting black brant, and occasional snowy owls. This is the northernmost nesting area for snowy plovers along the U.S. Pacific coast. It is another area of consistent American peregrine falcon sightings.

Rocks and islets that are part of Copalis National Wildlife Refuge (grid reference DH02 to CH95) are important shorebird and seabird nesting areas in spring and summer.

Rocks and islets that are part of Quillayute Needles National Wildlife Refuge (grid reference CH97 to CJ72) are also important shorebird and seabird nesting areas. The coastline between Hoh Head and Cape Flattery (grid reference CH89 to CJ76) has the highest density per mile of bald eagle nest sites in the continental United States.

5.4 COLUMBIA RIVER ESTUARY (Grid Reference DG21 to DG12)

The Columbia River is the largest river in western North America, draining approximately 668,220 square kilometers (258,000 square miles). The estuary itself is the largest in the Northwest Pacific Zone, encompassing some 375 square kilometers (145 square miles). The river has two distinct reaches: the estuary proper ranges from the river confluence with the Pacific Ocean upstream to Puget Island (grid reference DG12 to DG61); brackish water seldom penetrates beyond Puget Island due to the large volume of freshwater inflow from the Columbia River. The second reach extends from Puget Island to an area just below Bonneville Dam (grid reference DG61 to EF75), which is freshwater under tidal influence. The biotic resources of this section are keyed geographically using north-south UTM grid swaths.

5.4.1 Aquatic Resources

The Columbia River estuary is an important habitat to many aquatic species dependent upon it as a nursery, spawning, or feeding area and is a corridor for many important migratory fish species, including salmonids, shad, and sturgeon. Species distribution in the estuary is to a large degree dependent on salinity characteristics which can vary widely with season and tides.

Widespread Species

Finfish of importance in this section include: chinook, coho, chum, and sockeye salmon, steelhead trout, cutthroat trout, starry flounder, English sole, butter sole, Dover sole, sand sole, lingcod, Pacific tomcod, shiner perch, pile perch, smelts, striped bass, Pacific lamprey, river lamprey, green sturgeon, white sturgeon, American shad, Pacific herring, sculpins, northern anchovy, Pacific hake, and eulachon.

Geographic Inventory

Sport fishing for salmonids is concentrated at the mouth of the Columbia River (grid reference DG12 to DG31). This is also a prime commercial and sport fishing area for dungeness crabs and starry flounders. Abundant eelgrass beds provide important habitat for many invertebrates and nursery areas for juvenile salmonids, flatfish, rockfish, and cod; in particular, larval English sole are found as far upstream as Youngs Bay (grid reference DG21) and juveniles use the lower reaches of the estuary. Starry flounder and white sturgeon nursery areas occur in the vicinity of grid reference DG31.

Several anadromous fish spawning streams enter the Columbia River estuary along its widest section (grid reference DG31 to DG51): Lewis and Clark River and Youngs River (grid reference DG30) are American shad and coho salmon spawning streams; Grays River (grid reference DG42) is important for salmonids; and Big and Gnat Creeks (grid reference DG51) are important particularly for coho salmon. Harbor seal haulouts generally occur throughout this part of the estuary. Adult green and white sturgeons concentrate in three areas in this part of the estuary: near Knappton, Washington (grid reference DG32); off of Tongue Point (grid reference DG41); and in Grays Bay (grid reference DG42). Eulachon, or Columbia River smelt, spawn at the mouth of Grays River (grid reference DG42) in spring.

The Elochoman River (grid reference DG72) is another important salmon spawning run feeding the Columbia River estuary just below Puget Island.

Important salmon and steelhead nursery areas occur just upstream from Puget Island (grid reference DG71).

The Cowlitz River (grid reference EG00) supports the world's largest hatcheries of chinook and coho salmon as well as the largest steelhead trout sport catch in Washington.

The Willamette River (grid reference EF15) is an important spawning stream for salmonids and American shad.

A white sturgeon nursery area occurs in Vancouver Lake (grid reference EF25).

The Sandy River (grid reference EF44) is important for salmonids, American shad, and eulachon spawning and contains resident mountain whitefish.

5.4.2 Terrestrial Resources

Widespread Species

Numerous shorebird and waterfowl species use the many acres of marshes and tidelands of the Columbia River estuary on their migratory routes as feeding, resting, or overwintering habitat; many of these areas also are important for sport hunting. Great blue herons are fairly common throughout the Columbia River estuary as are many songbird species.

Terrestrial mammals occur in abundance along much of the Columbia River Estuary section. Raccoons, black-tailed deer, and black bears are fairly common throughout the less urbanized portions of this section.

Geographic Inventory

Sand Island, at the mouth of the Columbia River (grid reference DG22), is the site of a breeding colony of glaucous-winged gulls and western gulls. Some hybridizing between these two species also occurs here. California brown pelicans may be seen both on the island and across the channel at Clatsop Spit (grid reference DG21).

Between the mouth of the Columbia River and grid reference DG41, numerous waterfowl species, including loons, grebes, geese, American wigeon, pintail, and mallard, concentrate in bays and inlets. Grays Bay (grid reference DG42) is particularly noted for its waterfowl concentrations in the spring and fall. Bald eagles are common along the shoreline of this part of the estuary, using it as nesting, feeding, or overwintering habitat.

The large islands between grid reference DG41 and DG80 include the Lewis and Clark National Wildlife Refuge and the Columbian White-Tailed Deer National Wildlife Refuge. This area provides habitat for many species of migratory waterfowl, great blue heron rookeries, and a wide variety of terrestrial mammals. Beaver, fox, raccoon, and black-tailed deer are common on the islands. The endangered Columbian white-tailed deer can be found on islands and forested uplands in this part of the estuary, but primarily occurs within the boundaries of the Columbian White-Tailed Deer National Wildlife Refuge (grid reference DG62). Bald eagles nest along the riverbanks here; however, current data indicate no successful rearing of young in this area during the 1980 nesting season.

Ridgefield National Wildlife Refuge and Sauvie Island (grid reference EF17 to EF15) are important areas for many avian species, including gulls, herons, bitterns, grebes, swans, geese, dabbling ducks, diving ducks, sea ducks, mergansers, hawks, eagles, falcons, owls, songbirds, and woodpeckers. Several small mammals, elk, and black-tailed deer also occur. A great blue heron rookery occurs at nearby Shillapoo Lake (grid reference EF15).

A heron rookery and waterfowl concentration area occur on Reed Island (grid reference EF54); shorebirds, wading birds, raptors, songbirds, and several terrestrial mammals also are present on the island.

5.5 PUGET SOUND (Grid Reference CJ76 to DK72)

The Puget Sound section in this report represents three different areas: Puget Sound proper is the body of water lying south of a line between Port Townsend and Anacortes, Washington, including Hood Canal; the region to the north of this line includes the San Juan Islands and is part of the San Juan Archipelago. These two areas are connected to the open ocean by the Strait of Juan de Fuca to the west and the Strait of Georgia to the north.

Habitat diversity is great in the Puget Sound section. It contains rocky shores typical of the open coast, quiet sandy or muddy bays, mixed rocky-cobble areas, numerous estuaries, and deep trenches. Water conditions are extremely varied, influenced by a large freshwater inflow from rivers draining the Cascade and Olympic mountain ranges, narrow passages between islands that restrict tidal mixing, and by incoming and exiting ocean waters. Tides in the Puget Sound section are mixed, semidiurnal. The biotic resources of this section are keyed geographically using generally north-south UTM grid swaths.

5.5.1 Aquatic Resources

Widespread Species

Kelps, laminarians, and eelgrass are commonly found along nearshore areas of Puget Sound, the San Juan Islands, and the Strait of Juan de Fuca. Eelgrass is important as a nursery area for many fish and shellfish species and as a waterfowl feeding area.

Bivalves including gaper and common littleneck clams, basket cockles, and geoducks, as well as oysters, are important shellfish resources in the Puget Sound section and are widely distributed. Dungeness crab is an important sport and commercial species that is found over much of the nearshore area of Puget Sound.

Salmonids, including chinook, coho, chum, sockeye, and pink salmon, and steelhead trout, are the most important fish species caught in Puget Sound. All are taken by commercial and sport fisherman except sockeye salmon and steelhead trout, which are exclusively sport species. Indian tribes in the area fish for all of these salmonid species. The Puget Sound section contains over 10,000 streams running over 25,700 kilometers (16,000 miles) in total length, most of which support some type of salmonid activity. Salmon fishing is widespread in most of the marine waters within the San Juan Islands, the Strait of Juan de Fuca, and the remainder of Puget Sound. Other important, widespread species include lingcod, flatfish, rockfish, herring, and smelt.

Harbor seals are widespread throughout Puget Sound and haulouts occur on beaches or mudflats. Killer whales and a few other large marine mammals travel throughout this area.

Geographic Inventory

River estuaries of major importance to juvenile salmonids between Cape Flattery and Port Townsend, Washington (grid reference CJ76 to EJ13) include the Sekiu River (grid reference CJ94) and the Dungeness River (grid reference

DJ82 to DJ83). Commercial and sport fishing for salmonids is concentrated at Clallam Bay (grid reference DJ04).

Significant shellfish resources exist in shallow subtidal areas along the shorelines within Puget Sound between Port Townsend and Olympia (grid reference EJ13 to EH01). Geoduck clams and other bivalves including basket cockles, gapers, butter clams, and common littlenecks, are important species in both commercial and recreational fisheries. Dungeness crabs are caught recreationally throughout Puget Sound. Flatfish, rockfish, and smelt are important commercial and recreational species in Puget Sound; lingcod has been an important commercial and recreational species in Puget Sound, but fishing for it currently is prohibited south of Admiralty Inlet (grid reference EJ13). Pacific herring, a valuable commercial species, spawns in early spring in eelgrass and kelp beds throughout Puget Sound.

Hood Canal (grid reference EJ20 to DH84) contains numerous eelgrass beds and is one of the more significant areas for clams and oysters in the Puget Sound section. Pacific herring also use the eelgrass beds here as spawning areas. Oysters and shrimp are harvested commercially in the canal; shrimp no longer are caught commercially throughout much of southern Puget Sound. Two river estuaries of major importance to juvenile salmon enter Puget Sound from the west: the Quilcene River (grid reference EH19) and the Dosewallips River (grid reference EH08).

Oysters are harvested commercially in Budd, Eld, and Totten Inlets (grid reference DH91 to EH01). Pacific herring spawn in Totten Inlet and several other areas in southern Puget Sound.

The Nisqually River estuary (grid reference EH21) is of major importance to juvenile salmon. Eelgrass and sea lettuce occur here along with many species of shellfish. There is a harbor seal haulout in the wildlife refuge here.

McNeil Island (grid reference EH22) contains the only known harbor seal rookery within Puget Sound, although harbor seal haulouts occur throughout the area.

Dungeness crabs are caught commercially only north of Port Madison (grid reference EH38). Significant nursery areas include Port Susan, Skagit Bay, and Padilla Bay (grid reference EJ43 to EJ37). Three river estuaries of major importance to juvenile salmonids, empty into Puget Sound from the east: the Snohomish River (grid reference EJ51), the Stillaguamish River (grid reference EJ43), and the Skagit River (grid reference EJ45).

5.5.2 Terrestrial Resources

Widespread Species

Except for urban areas, much of the uplands of the Puget Sound section is covered by coniferous forest composed primarily of Douglas fir, western hemlock, and western redcedar. These tree species support a large timber industry and are economically important to the region.

Numerous shorebird and gull species are common year-round throughout the Puget Sound section. Glaucous-winged and western gulls are probably the most common gull species. Shorebirds generally are seen while migrating through Puget Sound; thus, the species present and their distribution change throughout the year. Great blue herons are a fairly common wading bird in Puget Sound, occupying delta areas of river mouths, tideflats, and cultivated fields throughout the region.

Puget Sound is rich in waterfowl species. Many are strictly migratory, appearing during only part of each year, while some are year-round residents. Migratory waterfowl, including diving ducks, dabbling ducks, and geese, support large recreational hunting activity in fall. The most common waterfowl species seen in this region include the Canada goose, American wigeon, and mallard.

Several species of hawks are common in deciduous woodland areas of the Puget Sound section. Bald eagles, though not really common, are widespread throughout the section. American peregrine falcons are rare residents in the mountainous portions of the Puget Sound section. Nest sites were not mapped due to the sensitive nature of this species.

Brandt's and double-crested cormorants are among the more common and widespread seabirds encountered in the Puget Sound section. Cormorants can be seen perching on pilings, bulkheads, or rocks over much of the shoreline of Puget Sound.

Passerine songbirds are distributed throughout the Puget Sound section and can be observed in almost all habitats containing some type of vegetation.

Small terrestrial mammals, including rabbits and hares, squirrels, and raccoons are common throughout Puget Sound, both in their natural habitats and in urban areas. Of the larger terrestrial mammals, only the black-tailed deer can be considered common. Black-tailed deer are extensively hunted in the less populated areas of Puget Sound.

Geographic Inventory

Seabird nesting occurs on Tatoosh Island (grid reference CJ76) in spring and summer; species include the fork-tailed and Leach's storm petrel, double-crested and pelagic cormorant, common murre, pigeon guillemot, marbled murrelet, Cassin's and rhinoceros auklet, and the tufted puffin.

Although fairly common throughout the Puget Sound section, bald eagle nesting is concentrated in two areas, one of which is the coastline just east of Cape Flattery (grid reference CJ76 to CJ95).

Six bays and estuaries along the Strait of Juan de Fuca (grid reference DJ04 to FJ11) are important stopover and overwintering sites for many species of shorebirds and waterfowl, including gulls, terns, sandpipers, loons, grebes, geese, dabbling ducks, diving ducks, sea ducks, and mergansers: Clallam Bay (grid reference DJ04), Freshwater Bay (grid reference DJ53), Port Angeles Harbor (grid reference DJ63), Dungeness Bay (grid reference DJ93), Sequim Bay (grid reference DJ92), and Port Discovery (grid reference EJ02 to EJ11). Waterfowl hunting is common in fall in many of these areas.

Protection Island (grid reference EJ02) is a very important seabird breeding area in spring and summer; species nesting here include pelagic cormorants, pigeon guillemots, rhinoceros auklets, and tufted puffins.

Indian Island, just inside the mouth of Puget Sound proper (grid reference EJ22) harbors an important great blue heron rookery. Shorebirds, wading birds, waterfowl, and seabirds overwinter in the nearby harbor.

River otters use the mouths of rivers and bays as nursery areas for their young in spring and summer; Hood Canal (grid reference EJ20 to EH15) is the region of greatest importance to river otters in the Puget Sound section. Two areas along the canal are also important shorebird and waterfowl overwintering areas: Dabob Bay (grid reference EH19) and the Great Bend (grid reference DH94).

West and south of Hood Canal, upland habitats are favored by several big game mammals. The mountain goat overwinters in an area near Mount Deception (grid reference DH89). Black bear and mountain lion adult, winter concentrations occur in an area centered around Mildred Lakes and the Hamma Hamma River (grid reference DH76 to DH87). Black-tailed deer occupy winter ranges centered around Price Lake (grid reference DH85) and Mason Lake (grid reference EH04).

Several important migratory stopover and overwintering sites for many species of shorebirds and waterfowl occur south and west of Puget Sound Narrows: in Carr Inlet, particularly Henderson Bay (grid reference EH24); in Totten Inlet, particulary Oyster Bay (grid reference DH91); in Eld Inlet (grid reference EH01); in Budd Inlet (grid reference EH01); in Nisqually Reach (grid reference EH12); and in Nisqually National Wildlife Refuge (grid reference EH21). An important brant overwintering area and a great blue heron rookery also occur in the refuge along with numerous songbirds. Waterfowl hunting is common, particularly in Nisqually Reach.

Shorebirds, wading birds, and waterfowl overwinter, and migratory seabirds stop over in spring and fall, in Commencement Bay near Tacoma, Washington (grid reference EH43) and in Elliot Bay near Seattle, Washington (grid reference EH47).

Several large bays north of Seattle and east of the San Juan Islands are important areas for shorebirds, wading birds, waterfowl, and seabirds: Elger Bay (grid reference EJ33) harbors a great blue heron rookery; Port Susan (grid reference EJ43), Skagit Bay (grid reference EJ45), and Padilla Bay (grid reference EJ37) are important waterfowl areas where hunting is common; Samish Island (grid reference EJ37) and Samish Bay (grid reference EJ38) harbor a great blue heron rookery and wintering waterfowl, respectively; and Bellingham Bay (grid reference EJ29 to EK30) is an important shorebird and waterfowl overwintering area and contains a great blue heron rookery.

Seabirds often can be found in the same areas as waterfowl and shorebird concentrations. Seabird nesting, however, is concentrated at Smith Island National Wildlife Refuge (grid reference EJ15) and on the rocks and islets included in the San Juan Islands National Wildlife Refuge (grid reference EJ06 to EJ09). The second of two bald eagle nesting concentrations in the Puget Sound section is in the San Juan Islands and these islands are also important nursery areas for river otters.

Three important migratory shorebird and waterfowl stopover and over-wintering areas occur near the United States-Canada border: Birch Bay (grid reference EK11), Semiahmoo Bay (grid reference EK12), and Boundary Bay (grid reference DK92).

5.6 LIST OF SOURCES FOR THE NORTHWEST PACIFIC ZONE

The List of Sources has been expanded into a matrix (Table 14), linking individual reference sources to the topics for which each reference was used in the preparation of the inventory maps and report.

Table 14. List of sources for the Northwest Pacific Zone.

				AQUATIC					TERRESTRIAL									
	Special Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
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Table 14 (continued).

				AQUATIC					TERRESTRIAL									
	Special Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
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Table 14 (continued).

				AQUATIC					TERRESTRIAL									
	Special Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
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	Special Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
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	Special Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
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	Special Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
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	Special Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
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	Special Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
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	Special Land Use Areas	Land Cover	Species with Special Status	Plants	Invertebrates	Fish	Reptiles and Amphibians	Mammals	Plants	Invertebrates	Shorebirds	Wading Birds	Waterfowl	Raptors	Seabirds	Songbirds and Others	Reptiles and Amphibians	Mammals
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APPENDIX

Terrestrial Plant Species with Special Status

Map number	Family/Species	
400	Madder family	Rubiaceae
	Island bedstraw	*Galium* *buxifolium* Green
401	Carrot family	Apiaceae
	San Diego coyote thistle	*Eryngium* *aristulatum* Jeps. var. *parishii* (Coult. & Rose)
	Mason's lilaeopsis	*Lilaeopsis* *masonii* Math. & Const.
	Adobe sanicle	*Sanicula* *maritima* Kell. ex Wats.
402	Aster family	Asteraceae
	Point Reyes blennosperma	*Blennosperma* *nanum* (Hook.) Blake var. *robustum* J. T. Howell
	Fountain thistle	*Cirsium* *fontinale* (Greene) Jeps. var. *fontinale*
	Otay tarweed	*Hemizonia* *conjugens* Keck
	Santa Susana tarweed	*Hemizonia* *minthornii* Jeps.
	Santa Cruz tarweed	*Holocarpha* *macradenia* (DC.) Greene
403	Barberry family	Berberidaceae
	Island barberry	*Mahonia* *pinnata* (Lag.) Fedde ssp. *insularis* (Munz)
404	Borage family	Boraginaceae
	San Francisco allocarya	*Plagiobothrys* *diffusus* (Greene) Jtn.
405	Mustard family	Brassicaceae
	Contra Costa wallflower	*Erysimum* *capitatum* (Dougl.) Green var. *angustatum* (Greene) G. Rossb.
	Santa Cruz wallflower	*Erysimum* *teretifolium* Eastw.
406	Stonecrop family	Crassulaceae
	Santa Monica Mountains dudleya	*Dudleya* *cymosa* (Lem.) Britton & Rose ssp. *marcescens* Moran
	Santa Cruz Island dudleya	*Dudleya* *nesiotica* (Moran) Moran
	Laguna Beach dudleya	*Dudleya* *stolonifera* Moran

continued

APPENDIX (continued).

Map number	Family/Species	
	Santa Barbara Island dudleya	*Dudleya traskia* (Rose) Moran
407	Cypress family	Cupressaceae
	Santa Cruz cypress	*Cupressus abramsiana* C. B. Wolf
408	Figwort family	Scrophulariaceae
	San Clemente Island paintbrush	*Castilleja grisea* Dunkle
	Salt marsh bird's beak	*Cordylanthus maritimus* Nutt. ssp. *maritimus*
	Soft bird's beak	*Cordylanthus mollis* Gray ssp. *mollis*
	Pennell's bird's beak	*Cordylanthus tennis* Gray ssp. *capillaris* (Penn.) Chuang & Heckard, comb. nov. ined.
	Monterey Dune monkey flower	*Mimulus guttatus* Fisch. ex. DC. ssp. *arenicola* Penn.
	Dudley's lousewort	*Pedicularis dudleyi* Elmer
409	Heath family	Ericaceae
	Baker's manzanita	*Arctostaphylos bakeri* Eastw.
	Hearst's manzanita	*Arctostaphylos hookeri* D. Don ssp. *hearstiorum* (Hoover & Roof) Wells
	San Bruno Mountain manzanita	*Arctostaphylos imbricata* Eastw.
	Pacific manzanita	*Arctostaphylos pacifica* Roof
	Alameda manzanita	*Arctostaphylos pallida* Eastw.
	Hanging gardens manzanita	*Arctostaphylos edmundsii* J. T. Howell var. *parvifolia* Roof
	Presidio manzanita	*Arctostaphylos hookeri* D. Don ssp. *ravenii* Wells
410	Pea family	Fabaceae
	Trask's milk-vetch	*Astragalus traskiae* Eastw.
	Trask's island lotus	*Lotus dendroideus* (Greene) Greene var. *traskiae* (Eastw. ex. Noddin) Isely

continued

APPENDIX (continued).

Map number	Family/Species	
	Santa Barbara false-lupine	*Thermopsis macrophylla* H. & A. var. *agnina* J. T. Howell
	Pacific Grove clover	*Trifolium polyodon* Greene
	Monterey clover	*Trifolium trichocalyx* Heller
411	Waterleaf family	Hydrophyllaceae
	Indian Knob Mountain balm	*Eriodictyon altissimum* P. V. Wells
	Lompoc yerba santa	*Eriodictyon capitatum* Eastw.
412	Mint family	Lamiaceae
	San Mateo thornmint	*Acanthomintha obovata* Jeps. ssp. *duttonii* Abrams
	San Diego County monardella	*Monardella linoides* Gray ssp. *viminea* (Greene) Abrams
	San Diego mesa mint	*Pogogyne abramsii* J T. Howell
413	Lily family	Lilaceae
	Dwarf golden star	*Bloomeria humilis* Hoover
	Tiburon mariposa	*Calochortus tiburonensis* Hill
	Roderick's fritillary	*Fritillaria roderickii* Knight
414	False mermaid family	Limnathaceae
	Cunningham Marsh meadow foam	*Limnanthes vinculans* Ornduff
415	Mallow family	Malvaceae
	San Clemente Island bush-mallow	*Malacothamnus clementinus* (Munz & Johns.) Kearn.
	Santa Cruz Island bush-mallow	*Malacothamnus fasciculathus* (Nutt.) Greene var. *nesioticus* (Rob.) Kearn.
416	Evening-primrose family	Onagraceae
	Presidio clarkia	*Clarkia franciscana* Lewis & Raven
	Pismo clarkia	*Clarkia speciosa* Lewis & Lewis ssp. *immaculata* Lewis & Lewis

continued

APPENDIX (concluded).

Map number	Family/Species	
	Antioch Dunes evening-primrose	*Oenothera deltoides* Torr. & Frem. var. *howellii* Munz
417	Grass family	Poaceae
	Marin bent-grass	*Agrostis balsdalei* Hitchc. var. *marinensis* Crampton
	Leafy reed-grass	*Calamagrostis foliosa* Kearn.
	California orcuttia	*Orcuttia californica* Vasey var. *californica*
	Hoover's semaphore grass	*Pleuropogon hooverianus* (L. Benson) J. T. Howell
418	Buckwheat family	Polygonaceae
	Orcutt's chorizanthe	*Chorizanthe orcuttiana* Parry
	Butterworth's buckwheat	*Eriogonum butterworthianum* J. T. Howell
	Conejo buckwheat	*Eriogonum crocatum* Davidson
	Santa Barbara Island buckwheat	*Eriogonum giganteum* Wats. var. *compactum* Dunkle
	San Nicolas Island buckwheat	*Eriogonum grande* Greene var. *timorum* Reveal
419	Crowfoot family	Ranunculaceae
	Baker's larkspur	*Delphinium bakeri* Ewan
	San Clemente Island larkspur	*Delphinium kinkiense* Munz
	Yellow larkspur	*Delphinium luteum* Heller
420	Buckthorn family	Rhamnaceae
	Hearst's ceanothus	*Ceanothus hearstiorum* Hoover & Roof
	Maritime ceanothus	*Ceanothus maritimus* Hoover
	Mason's ceanothus	*Ceanothus masonii* McMinn
421	Rose family	Rosaceae
	Hickman's cinquefoil	*Potentilla hickmanii* Eastw.

END

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